

Public Works / Finance Committee



Regular Meeting ~Agenda~

Laurie M. Hopkins
City Clerk

www.ci.moscow.id.us

208.883.7015

**Monday
September 26, 2022**

4:00 PM

**Council Chambers
206 E. Third St.**

The Moscow Mayor, City Council and Staff welcome you to today's meeting. We appreciate and encourage public participation. For regular agenda items, an opportunity for public comment is sometimes provided after the staff report. However, the formality of procedures varies with the purpose and subject of the agenda item and limitations may be placed on the time allowed for comments. If you plan to address the Committee, you will find a list of "Tips for Addressing the Council" in the door pocket outside the City Council Chambers. Please note that Committee meetings are televised, videotaped and/or recorded. Links to view the Committee meeting live can be found on the City website, YouTube, Facebook and Spectrum Cable 1301. Thank you for your interest in City government.

REGULAR AGENDA

1. Approval of Public Works/Finance Committee September 12, 2022 Minutes (ACTION ITEM) - Taylor Riedner

2. Moscow Brewery District Oktoberfest Alcohol Use Request in Entertainment District (ACTION ITEM) - Amanda Argona

Rants and Raves Brewery is hosting the Moscow Brewery District Oktoberfest on Saturday, October 15th, from 2 pm to 6 pm on N. Jackson Street between C Street and the north entrance to Inland North Waste's Recycling Center. The applicant anticipates no more than six (6) beer and/or wine tents/vendors, in addition to the applicant's food truck. Live music is also scheduled as part of the festivities. The event has been reviewed and approved by staff as of September 16, 2022.

Following standard operating procedures for events with alcohol that are within the Entertainment District boundaries, Moscow Brewery District Oktoberfest is requesting a temporary suspension of the open container law by resolution. Per Moscow City Code, Section 10-1-12; a draft resolution has been prepared for Council's consideration.

PROPOSED ACTIONS: Recommend approval of the resolution allowing for the temporary suspension of the open container law within the event footprint of Moscow Brewery District Oktoberfest for the duration of the event; or provide staff with further direction.

3. Picabu Estates 1st Addition - Engineering Variance (ACTION ITEM) - Todd Drage

The developer of the Picabu Estates Subdivision, Mark Pica, has requested the reduction in width of the pathway running north/south on the west side of the Picabu Street from the current 10 foot width to the standard sidewalk width of 5 feet. The City Pathways Master Plan calls for a pathway to be located along Lanny Drive as well as extending north from the Picabu Street/Lanny Drive intersection. When the Pathways Commission and the Parks and Recreation Commission reviewed the Picabu Estates subdivision during the platting process in 2016 it was determined that because Lanny Drive was designated as a collector, the dedicated bike lanes with no on-street parking would meet the bicycle needs and is within the spirit of the Master Plan.

The developer subsequently expressed concern with the lack of on-street parking in the subdivision and in lieu of bike lanes on Lanny Drive a 10-foot wide pathway on the south side of the street was approved instead. The 10 foot wide path was also extended to the north along the west side of Picabu Street,

which terminates into undeveloped property to the north. City staff from Engineering, Planning, and Parks and Recreation reviewed the proposal and determined that if a future pathway were to be extended to the northeast of the subject property, pedestrians and bicyclists would be able to use the sidewalks and Picabu Street for access and the short segment of 10-foot wide pathway was not needed.

Therefore, it is staff's recommendation that the Council approve the reduction of the pathway on Picabu Street from 10 feet to the standard 5-foot width.

PROPOSED ACTIONS: Recommend approval of the engineering variance allowing the applicant to reduce the required sidewalk width along the west side of Picabu Street from 10 feet wide to 5 feet wide per City Standard, or provide staff with further direction.

4. Booster Station Replacement Phase II Rebid - Bid Results (ACTION ITEM) - Scott Bontrager

The Booster Station Replacement - Phase II Rebid project includes the construction of two (2) new booster pump stations located near the Indian Hills and Ponderosa Subdivisions. The work will include new Concrete Masonry Units (CMU) block buildings, site improvements, piping, pumps, electrical components, and controls. The City published an advertisement for bids on August 13, 2022 and the Engineer's Estimate for construction is \$4,641,900.00. Bids were opened on Tuesday, September 13, 2022. Three responsive bids were received, with bids ranging from \$4,231,000.00 to \$4,856,398.00. Of those, the lowest responsive bid was submitted by TML Construction, Inc. with a bid of \$4,231,000. A bid analysis is included in the Committee packet.

PROPOSED ACTIONS: Recommend acceptance of the bid from TML Construction, Inc., award the contract for \$4,231,000, and authorize staff approval of construction change orders in an amount not to exceed 10% of the contract amount, or provide staff further direction.

5. Police STEP Grant Award Acceptance (ACTION ITEM) - Alisa Anderson / Eric Warner

In 2021, the Moscow Police Department (MPD) was awarded a grant for the Selective Traffic Enforcement Program (STEP). The Idaho Transportation Department (ITD), Office of Highway Safety (OHS) sponsors this program for Idaho to address specific behaviors related to traffic safety priority areas and safety deficiencies within local law enforcement jurisdictions. The STEP grants are focused on combatting traffic crashes resulting in fatal and serious injuries and the grant funding reimburses law enforcement departments for time dedicated to traffic enforcement by tracking problem identification to include objectives, performance measures and targets, and expenses. The MPD has received notification of award for a second year of funding for \$100,000 to include \$88,000 for regular-time traffic officer enforcement plus \$12,000 for overtime with the allowable benefit percentages. The new grant award period is October 1, 2022 through September 30, 2023, which matches the City's FY2023 budget cycle.

PROPOSED ACTIONS: Recommend approval for the Moscow Police Department to accept the STEP grant award in an amount not to exceed \$100,000 for the FY2023 budget period, or provide staff with further direction.

6. CDBG Park Improvements Request for Additional Funding (ACTION ITEM) - Alisa Anderson / Nate Suhr

The City applied for a \$225,000 Idaho Community Development Grant (ICDBG) for Public Parks ADA Accessibility Improvements from the Idaho Department of Commerce (IDOC) for Mountain View and Indian Hills Parks. The City received a full award and executed a contract on 7/21/2021. The project descriptions and current project costs are attached to this report. Staff is presenting this project update seeking approval to request additional funding from IDOC due to increases in construction costs.

PROPOSED ACTIONS: Approval to request additional grant funding in an amount not to exceed \$150,000 from IDOC for the ADA Accessibility Improvement Projects for Mountain View and Indian Hills Parks, or provide staff with further direction.

REPORTS

Staff Report (if needed)

Construction Project Update - Scott Bontrager

ADJOURN

NOTICE: It is the policy of the City of Moscow that all City-sponsored public meetings and events are accessible to all people. If you need assistance in participating in this meeting or event due to a disability under the ADA, please contact the City's ADA Coordinator by phone at (208) 883-7600, TDD (208) 883-7019, or by email at adacoordinator@ci.moscow.id.us at least 48 hours prior to the scheduled meeting or event to request an accommodation. The City of Moscow is committed to ensuring that all reasonable accommodation requests are fulfilled.

Public Works / Finance Committee



Regular Meeting ~Minutes~

Laurie M. Hopkins
City Clerk

www.ci.moscow.id.us

208.883.7015

**Monday
September 12, 2022**

3:00 PM

**Council Chambers
206 E. Third St.**

The meeting was called to order at 3:00 p.m.

PRESENT: Gina Taruscio, Hailey Lewis, Maureen Laflin

OTHERS: Mayor Arthur Bettge, Council Member Sandra Kelly, Council Member Julia Parker

STAFF: Bill Belknap, Jen Pfiffner, Cody Riddle, Sarah Banks, Tyler Parker, Aimee Hennrich, Mia Bautista, Taylor Riedner

REGULAR AGENDA

1. Approval of Public Works/Finance Committee August 22, 2022 Minutes (ACTION ITEM) - Taylor Riedner

The minutes were approved as presented.

2. Disbursement Report August 2022 (ACTION ITEM) - Sarah Banks

Presentation of the Accounts Payable Report for the month ending August, 2022.

ACTION: Approve and authorize the use of digital signatures to sign the Disbursements Report for the month of August 2022.

Banks presented the item by highlighting major expenditures including the third quarter payment for Whitcom services, and a supply line upgrade for the Taylor Booster Station.

Lewis asked for more details on the Fines and Penalties line item, Banks said she would look into it and follow up with her at a later time.

The Committee recommended approval and that it be placed on the Council consent agenda.

3. Public Meeting: Proposed Lot Division at 411 E Seventh Street (ACTION ITEM) - Aimee Hennrich

The applicant, Donald Anderson, is requesting a lot division to create two lots of approximately 7,430 sf and 5,425 sf in size from one existing parcel of 12,855 sf in size. The intention of the lot division is to create a separate buildable lot from the existing house at 411 E Seventh Street so that both lots can be sold individually.

The subject property is located within the Multiple Family (R-4) Zoning District, which requires a minimum lot size of 5,000 square feet and a minimum lot width of 50 feet for single-family dwellings. Both proposed lots meet the minimum lot area and width requirements of the R-4 Zone, and the existing single-family dwelling will meet all setback requirements. Property owners within 600 feet of the property have been notified of the proposed division and a sign was posted seven (7) days prior to the public meeting date.

PROPOSED ACTIONS: Take public comment if applicable and recommend approval of the lot division request with conditions; or recommend approval of the lot division request with no conditions; or recommend denial of the lot division request; or provide staff with further direction.

Hennrich introduced the item by reviewing the subject property and explained the accessory carriage house located in the rear portion of the second lot is uninhabitable. The house is considered an accessory dwelling structure rather than an accessory dwelling unit due to its current condition. Staff conditions include

removing the carriage house in order to meet zoning requirements prior to approving the lot division.

Rod Olps (Moscow) asked for clarification regarding the driveway access to both lots with the proposed lot division.

Don Anderson (Applicant) shared the process of the division proposal and history of the property.

The Committee recommended approval with the condition of removing the carriage house, and that it be placed on the Council consent agenda.

4. Moscowberfest Alcohol Use Request in Entertainment District (ACTION ITEM) - Amanda Argona

The Moscow Chamber of Commerce is hosting the second annual Moscowberfest on Saturday, October 8th, from 4 pm to 8 pm on Main Street between 3rd and 6th Streets. The event is intended to be an annual event stylized in the spirit of fall folk festivals. The applicant anticipates no more than ten (10) beer and/or wine tents/vendors and up to six (6) food vendor tents. An additional four (4) to six (6) vendors will facilitate street games, activities, and competitions. The event has been reviewed and approved as of August 11, 2022.

Following standard operating procedures for events with alcohol that are within the Entertainment District boundaries, Moscowberfest is requesting a temporary suspension of the open container law by resolution. Per Moscow City Code, Section 10-1-12; a draft resolution has been prepared for Council's consideration.

PROPOSE ACTIONS: Recommend approval of the resolution allowing for the temporary suspension of the open container law within the event footprint of Moscowberfest for the duration of the event; or provide staff with further direction.

Pfiffner introduced the item as written above. Needing no further discussion, the Committee recommended approval and that it be placed on the Council consent agenda.

5. University Street Maintenance Agreement Update (ACTION ITEM) - Tyler Palmer

For many years, the City of Moscow (City) has relegated maintenance responsibilities for City rights-of-way that fall within the footprint of the University of Idaho (University) Campus. This arrangement was requested by the University of Idaho to allow for consistent treatment and aesthetics within the direct campus area. The City compensates the University for said maintenance based on a formula that captures the costs that the City would otherwise incur maintaining the designated infrastructure. The last update took place in 2008. This update makes adjustments to the contract and compensation formula to reflect changes that have occurred since the previous version was drafted including; Street budget updates, street light inventory and ownership updates, and storm permits for both the University and the City. The FY23 payment, in accordance with the proposed formula will be \$90,208.00

PROPOSED ACTIONS: Approve the Street Maintenance Agreement with the University Of Idaho; or provide staff further direction.

Palmer introduced the item by reflecting on the long relationship history between the City and University for street maintenance. The University of Idaho has agreed with the proposed updates and changes made to the agreement. The budget would go from roughly \$45,000 in previous years to \$90,208 the next fiscal year. Staff believes this cost reflects what the City would need to expense should it be responsible for the outlined rights of way, which the University has maintained for years. The University would be responsible for crack fills, patches, snow removal, and more on the outlined streets. The Committee recommended approval and that it be placed on the Council consent agenda.

6. Update to the 2016 Bike Route and Facilities Plan (ACTION ITEM) - Cody Riddle

The City's Bike Route and Facilities Plan was adopted by resolution in June of 2016. The plan identifies specific routes and treatments for bicycle facilities. Since adoption, City staff have been working to implement the plan, and to date a significant number of the improvements have been completed. City staff and leadership receive regular feedback, both positive and negative, on the

impacts associated with the installation of bike facilities. Based on this, and knowledge gained through implementation and operation of facilities, staff presented a series of recommended changes to the Transportation Commission on August 11, 2022. The Commission unanimously supported the proposed changes. The changes are summarized on the draft map and chart attached to this report. They will be presented in detail to the Committee on September 12, 2022. Staff will present a series of recommended updates to the Bike Route and Facilities Plan, initially adopted by City Council in 2016.

PROPOSED ACTIONS: Recommend approval of the resolution to adopt changes to the Bike Route and Facilities Plan to City Council; or provide staff further direction.

Riddle introduced the item by sharing the fourteen proposed changes to the Plan that are outlined in the meeting packet. Some of the recommendations will be a part of future projects and may not happen for a few fiscal years or as grant opportunities arise. The Committee recommended approval and that it be placed on the Council regular agenda.

7. T- Mobile Wireless Communications Facility Lease Agreement (ACTION ITEM) - Bill Belknap

The City was approached by T-Mobile with a request to install a wireless communications facility upon the water tank located at Rotary Park. The proposed antenna and equipment installation plans have been reviewed and approved by the Engineering and Water Departments and Staff has prepared a wireless communications facility lease agreement for the Council's review and approval. Under the lease agreement, T-Mobile will pay the City \$28,800 per year with an annual escalator of three percent. The term of the agreement is five years with the option for five additional renewal terms.

PROPOSED ACTIONS: Recommend approval of the wireless communications facility lease agreement; or provide staff further direction.

Belknap introduced the item as written above and reviewed the standard lease agreement with a 3% annual increase and the payment requirements from T-Mobile to the City. The City anticipates this to be standard cellular services and communication equipment. The Committee recommended approval and that it be placed on the Council consent agenda.

8. Idaho Airport Aid Program - Grant Agreement (ACTION ITEM) Bill Belknap

The Pullman-Moscow Regional Airport has applied for a grant from the Idaho Transportation Department - Division of Aeronautics from the Idaho Airport Aid Program for the construction of a new airport terminal. The grant request has been awarded for \$100,000 with a required project completion date of June 20, 2026. The attached Resolution authorizes the acceptance of the award in accordance with all Federal, State, and Local regulations and the execution of the Grant Agreement by the Mayor.

PROPOSED ACTIONS: Recommend approval to authorize acceptance of the Idaho Airport Aid grant award of \$100,000 from the Idaho Transportation Department - Division of Aeronautics and approve the corresponding Resolution, or provide staff further direction.

Belknap introduced the item as written above and explained the grant funds will go towards the current terminal project. There are no local match obligations to the City and the City of Pullman is aware of the grant terms and obligations. Needing no further discussion, the Committee recommended approval and that it be placed on the Council consent agenda.

REPORTS

Staff Report (if needed)

No report needed.

ADJOURN

The meeting adjourned at 3:43 p.m.

COMMITTEE STAFF REPORT

DATE: Monday, September 26, 2022



RESPONSIBLE STAFF

Amanda Argona, Community Events Manager

ADDITIONAL PRESENTER(S)

OTHER RESOURCES

Jen Pfiffner, Deputy City Supervisor - Recreation, Culture and Employee Services

AGENDA ITEM TITLE

Moscow Brewery District Oktoberfest Alcohol Use Request in Entertainment District (ACTION ITEM) - Amanda Argona

DESCRIPTION

Rants and Raves Brewery is hosting the Moscow Brewery District Oktoberfest on Saturday, October 15th, from 2 pm to 6 pm on N. Jackson Street between C Street and the north entrance to Inland North Waste's Recycling Center. The applicant anticipates no more than six (6) beer and/or wine tents/vendors, in addition to the applicant's food truck. Live music is also scheduled as part of the festivities. The event has been reviewed and approved by staff as of September 16, 2022.

Following standard operating procedures for events with alcohol that are within the Entertainment District boundaries, Moscow Brewery District Oktoberfest is requesting a temporary suspension of the open container law by resolution. Per Moscow City Code, Section 10-1-12; a draft resolution has been prepared for Council's consideration.

STAFF RECOMMENDATION

Recommend approval of the resolution allowing for the temporary suspension of the open container law within the event footprint of Moscow Brewery District Oktoberfest for the duration of the event; or provide staff with further direction.

PROPOSED ACTIONS

PROPOSED ACTIONS: Recommend approval of the resolution allowing for the temporary suspension of the open container law within the event footprint of Moscow Brewery District Oktoberfest for the duration of the event; or provide staff with further direction.

FISCAL IMPACT

PERSONNEL IMPACT

ATTACHMENTS

1. Resolution 2022 - Beer-Wine_The Entertainment District_Brewery District Oktoberfest_draft_final

RESOLUTION NO. 2022 - ____

A RESOLUTION OF THE CITY OF MOSCOW, A MUNICIPAL CORPORATION OF THE STATE OF IDAHO, TO ALLOW FOR THE TEMPORARY VENDING OF BEER AND/OR WINE AND EXEMPTION TO THE OPEN CONTAINER PROHIBITION IN THE ENTERTAINMENT DISTRICT UNDER SPECIFIC REGULATIONS AND UNDER CERTAIN LIMITED CONDITIONS PURSUANT TO MOSCOW CITY CODE 10-1-12; PROVIDING THIS RESOLUTION TO BE EFFECTIVE UPON ITS PASSAGE AND APPROVAL.

WHEREAS, Moscow City Code 9-6-35 and 9-8-17 prohibit any person from selling, serving, giving away, dispensing, consuming or carrying any beer or wine in open containers on or in any public street, highway, alley, lane, sidewalk, public or private parking lot, conveyance, or primary and secondary school facility in the City of Moscow, Idaho (hereinafter “City”) except in accordance with specific regulations adopted by the Council by Resolution; and

WHEREAS, The Entertainment District is defined in Moscow City Code 10-1-12 as an exemption to the Open Containers Prohibition (hereinafter “The Entertainment District”); and

WHEREAS, Rants and Raves Brewery (hereinafter “the Event Sponsor”) desires to have its sponsored event, Moscow Brewing District Oktoberfest (hereinafter “the Permitted Event”), in The Entertainment District (see Attachment “A”); and

WHEREAS, the Permitted Event (see Attachment “B”) is an event or series of events sponsored by the Event Sponsor, intended to promote family and community fellowship; and

WHEREAS, Council wishes to allow for the vending and responsible consumption of beer and/or wine under certain conditions, contained herein and during limited hours during the Permitted Event; and

WHEREAS, Council wishes to prohibit the sale and/or consumption of liquor during the Permitted Event; and

WHEREAS, Council believes the regulations contained herein are appropriate; and

WHEREAS, Council believes that the specific regulations contained herein balance health and safety concerns of citizens with the desire to promote responsible use of alcoholic beverages; and

WHEREAS, nothing contained in this Resolution is intended to waive other laws and regulations applicable to the sale and consumption of alcohol within City limits (including a requirement for a catering permit; a beer and wine permit for benevolent, charitable and public purpose events; or a winery sponsored event permit); and

WHEREAS, nothing contained within this Resolution is intended to endorse or support any particular belief, philosophy, or political position of the Event Sponsor or of the Permitted Event, and/or its affiliates, associations, contributors, supporters, participants, etc.;

NOW, THEREFORE, BE IT RESOLVED by the Mayor and City Council of the City of Moscow, Idaho as follows:

SPECIFIC REGULATIONS ON THE SALE AND/OR CONSUMPTION OF BEER AND/OR WINE DURING MOSCOW BREWING DISTRICT OKTOBERFEST 2022:

Intent:

This Resolution is intended to allow the sale and consumption of beer and wine only (not liquor), pursuant to these specific regulations and is not intended to amend or expand the Moscow City Code or any other applicable law or regulation beyond the scope of the particulars of this Resolution or beyond the hours of the Permitted Event. Other than as specifically provided herein, park, sanitary, health, litter, police, fire, sidewalk café, alcohol vending, and other laws and regulations shall be unaffected by this Resolution. This Resolution is not a waiver of any State, County, or local requirement of a permit or licensure related to sales and/or distribution of alcohol including a requirement for a catering permit; a beer and wine permit for benevolent, charitable and public purpose events; or a winery sponsored event permit. This Resolution shall not establish precedent nor shall it apply to any event other than the Permitted Event held on the 15th day of October, 2022, from 2:00 p.m. to 6:00 p.m.

Liability, Insurance and Safety:

1. No less than ten (10) days prior to the Permitted Event at which the licensed vendor(s) will sell beer and/or wine, the Event Sponsor shall deliver to the Community Events Division one (1) copy of written proof that the licensed vendor(s) has current, paid up, off-premise liquor liability insurance or special event insurance in an amount not less than One Million Dollars (\$1,000,000) combined single limits. City shall be named as an additional insured on the insurance policy of the licensed vendor.
2. No less than ten (10) days prior to the first activity of the Permitted Event herein described, the Event Sponsor shall deliver to the Community Events Division one (1) copy of written proof that the Permitted Event has obtained current, paid up, general liability insurance or special event insurance in an amount not less than One Million Dollars (\$1,000,000) combined single limits. Such general liability insurance or special event insurance policy shall be primary to any other insurance related to these events and to that of any potential party subject to a claim related to the Permitted Event.
3. The Moscow Police Chief or designee is hereby empowered to order the immediate cessation of all activities allowed under this Resolution at any time they reasonably determine that it is in the best interest of City to do so. There shall be no appeal from a determination by the Moscow Police Chief or their designee to terminate all or part of the Permitted Event.

Vendor/Event Sponsor:

1. The number of licensed vendors selling beer and/or wine allowed at the Permitted Event, will be reviewed and approved as part of the permitting process.
2. Event Sponsor is required to ensure all beer and/or wine shall be sold only by a licensed vendor.
3. Every licensed vendor shall obtain and shall comply with all alcohol related laws and regulations, including, but not limited to, the City requirement of a City catering permit; a State beer and wine permit for benevolent, charitable, or public purpose events; or a winery sponsored event permit.

4. The name, address, telephone number, alcohol license permit number of every licensed vendor, shall be provided to the Community Events Division at the same time the required proof of insurance is provided.
5. The City shall play no role in determining which vendor shall be selected to sell alcoholic beverages in the Entertainment District during the Permitted Event, unless it is a City sponsored event.
6. The Event Sponsor shall provide at least two (2) persons to check proper identification for those who shall be consuming beer and/or wine during the Permitted Event. These persons shall be clearly identified and shall be stationed at a central identification checking station where they shall issue one (1) wristband per individual 21 years of age or older.
7. The Event Sponsor shall provide at least two (2) law enforcement officers or two (2) guards from a recognized private security firm to provide security for the Permitted Event. Such officers or guards shall be clearly identified as such and shall be on duty at all times beer and/or wine is being served during the Permitted Event. The Chief of Police shall make the determination of whether law enforcement officers are required and in the event the Chief of Police approves the use of a private security firm, the Event Sponsor shall obtain written permission for use of said private security firm by the Chief of Police or designee.
8. The Event Sponsor and City both specifically understand and acknowledge that the Event Sponsor shall be solely responsible for any and all liability resulting from action or inaction, and/or negligence, and/or gross negligence by security provided by the Event Sponsor for the Permitted Event.

Sales and Consumption:

1. No less than ten (10) days prior to the Permitted Event at which the licensed vendor will sell beer and/or wine, the Event Sponsor shall deliver to the Community Events Division a finalized site map which shall be drawn to show the locations, dimensions of, and relative distances between the following: (a) the beer and/or wine sales and dispensing area within The Entertainment District; and (b) food sales and service areas. Said site design and any subsequent alterations shall be approved in writing by Moscow Deputy City Supervisor – Recreation, Culture, and Employee Services or their designee, and by the Moscow Chief of Police prior to the Permitted Event.
2. All beer and/or wine sales and dispensing shall take place within the area designated by the Event Sponsor and as shown on the site map required by this Resolution.
3. All food sales and service shall have a space of no less than ten feet (10') between the approved beer and/or wine sales and dispensing area and the food sales or service area.
4. The Event Sponsor shall include an identification checking station and its general location on Event Site Map.
5. No person shall be allowed to purchase beer and/or wine other than within the area designated for beer and/or wine sales and dispensing as shown on the map required by this Resolution and only persons with a designated wristband shall be allowed to purchase, possess, and consume beer and/or wine.
6. All beer and/or wine shall be dispensed in and consumed from the designated Event container. Such container shall be a readily identifiable container not more than sixteen ounces (16 oz.) in size which shall not bear a logo of an alcoholic beverage.
7. Every occupant within The Entertainment District shall provide identification to law enforcement officers or City employees at any point in time or location when requested to do so.

8. No person under twenty-one (21) years of age shall be allowed to wear the designated wristband at any time during the Permitted Event.
9. A sign shall be prominently posted at or near the area designated for beer and/or wine sales and dispensing stating that service to persons under twenty-one (21) years of age is prohibited.
10. Beer and/or wine shall be sold only within the designated area in The Entertainment District and only between the hours of 2:00 p.m. and 6:00 p.m. local time on the 15th day of October, 2022, during the Permitted Event.
11. Beer and/or wine shall be consumed only within The Entertainment District between the hours of 2:00 p.m. and 6:00 p.m. local time on the 15th day of October, 2022, during the Permitted Event.
12. No person shall carry or consume any alcoholic beverage within The Entertainment District which is not purchased or dispensed from the licensed vendor(s) at the Permitted Event. Consumption of alcohol outside of The Entertainment District, in any public street, highway, alley, lane, sidewalk, public or private parking lot, conveyance, or primary and secondary school facility in the City of Moscow, shall be considered a violation of the City's open container ordinance.

Fee:

The Event Sponsor shall submit to the Community Events Division, within ten (10) days of the event, any remaining required fees established by Council that is associated with this Resolution.

Failure To Comply:

Failure to comply with this Resolution shall expose any such person to all relevant civil and criminal consequences and may result in denial of subsequent applications for alcohol permits in public parks for a period of no less than five (5) years.

PASSED on Motion by the Following Vote:

	Aye	Nay	Abstain	Absent
Hailey Lewis	_____	_____	_____	_____
Gina Taruscio	_____	_____	_____	_____
Sandra Kelly	_____	_____	_____	_____
Maureen Laflin	_____	_____	_____	_____
Anne Zabala	_____	_____	_____	_____
Julia Parker	_____	_____	_____	_____

ADOPTED by the City Council of the City of Moscow, Idaho and **APPROVED** by the Mayor of the City of Moscow, Idaho this ____ day of _____, 2022.

Arthur D. Bettge, Mayor

CERTIFICATION and ATTESTATION. I hereby certify that the above is a true copy of a Resolution passed at a regular meeting of the City Council, City of Moscow, held on _____, 2022 and attest to the Mayor's signature.

Laurie M. Hopkins, City Clerk

Exhibit 'A' - Entertainment District Boundary



Attachment B

City of Moscow Community Events Division EVENT APPLICATION



*Thank you for your interest in organizing/sponsoring an Event in the City of Moscow!
Events by local citizens add to the cultural wealth of our town and may range from fun runs to political marches,
neighborhood block parties to street fairs.*

Submit completed forms electronically or physically to the Community Events office:
communityevents@ci.moscow.id.us or 221 E. Second Street, Moscow. All applications must be legible.

The City reserves the right to request additional information reasonably necessary to a fair determination as to issuance of a permit. Permits are issued on a first-come, first-served basis. According to Moscow City Code Title 10 Section 17-4, event applications for regular or recurring events must be submitted at least sixty (60) days and not more than one hundred eighty (180) days before the proposed date of the event. Event applications for single, non-recurring events must be submitted at least ten (10) days and not more than one hundred eighty (180) days before the proposed date of the event.

Events with alcohol are to be submitted at least two (2) months prior to the event date to allow for adequate review and presentation to Administrative Committee and City Council. Administrative Committee meets on the 2nd and 4th Monday of each month and City Council meets on the 1st and 3rd Monday of each month pending no holiday delays or rescheduling of meetings.

1. Name of Event: Moscow Brewing District Oktoberfest
 2. Event Date(s): October 15, 2022
 3. Event Location: 308 N Jackson Street
 4. Are you requesting a street closure for Event? Yes ☒ No ☐
- If **yes**, provide street closure location(s). List cross streets, intersections, building addresses, etc. Include these details on your site map (see item 27.)

N Jackson Street and C street

5. Do you require parking restrictions for the Event? Yes ☒ No ☐
- If **yes**, list parking restrictions (i.e. no parking on day of event, parking restricted to a particular area, etc.).

6. Street Closure set-up/Load-in time: 1:00pm Event(s) Start time: 2:00pm
7. Event(s) End time: 6:00pm Street Closure take-down/Load-out time: 7:00pm
8. Is this a recurring Event (i.e. every 1st Thurs. or every Sat. May thru Oct.)? Yes ☐ No ☒
9. Is this an annual Event? Yes ☒ No ☐
10. Are you planning on having refreshments and/or food? Yes ☒ No ☐

EVENT APPLICATION – LAST UPDATED AUGUST 11, 2021

Page 1 of 8

City of Moscow Community Events Division
EVENT APPLICATION



If **yes**, describe your waste and recycling plan. Applicants are responsible for removing all waste from their event footprint and disposing of properly, including emptying permanent trash receptacles in the downtown area. Dumpsters located downtown are for private use.

We will use Rants & Raves Dumpster for disposing all waste. We will have trash bins set up for event and we will have volunteers emptying the bins to keep bins useable during the event

11. Are you planning on serving alcohol/having alcohol available for purchase at the Event?

Yes ☒ (continue to Q.12)

No ☐ (skip to Q.14)

**All events with alcohol are required to have a Catering Permit.
This process is to be handled by your licensed alcohol Vendor.**

Catering Permit applications are to be submitted to the City Clerk/Deputy City Clerk for approval.

12. Is the Event taking place in the public right-of-way (i.e. sidewalks, streets, etc.) within the City of Moscow Entertainment District? The Entertainment District allows for a temporary suspension of the Open Container law by Resolution of the City Council. See page 6 for a map of the Entertainment District.

Yes ☒ (continue to Q.13)

No ☐ (skip to item B.)

13. Are the Event organizers interested in pursuing a temporary suspension of the Open Container law by City Council Resolution?

Yes ☒ (see item A.)

No ☐ (skip to item B.)

A. Event organizers pursuing a temporary suspension by City Council Resolution of the Open Container law for their Event within the public right-of-way of the Entertainment District boundaries must satisfy the following conditions with their Event listed below, in addition to any requirements detailed in the Moscow City Code, as set forth by City Council Resolution, and/or Catering Permit:

- ☐ Include an identification checking station and its general location on Event Site Map. Identification checking station shall include a minimum of two (2) persons to check proper identification. These persons shall be clearly identified and be responsible for the issuance of wristbands denoting attendees are of legal drinking age.
- ☐ Submit the Alcohol Use Application and \$100 non-refundable fee upon approval of Event.
- ☐ Be present at City of Moscow Administrative Committee and City Council meetings regarding authorization of alcohol at Event by Resolution.
- ☐ Post signage and waste receptacles at Event entry and exit points. Signage to clearly state "No Alcohol Permitted Beyond this Area". Additional requirements may be mandated by City Council Resolution.

City of Moscow Community Events Division
EVENT APPLICATION



B. Event organizers requesting for alcohol use for their Event that takes place in the public right-of-way **NOT** within the Entertainment District boundaries must satisfy the following conditions with their Event, in addition to following any requirements set forth by Resolution and/or Catering Permit. This option is also available to Event organizers who are **NOT** pursuing a temporary suspension by City Council Resolution of the Open Container law:

- ☐ Include the location and estimated size of the beer garden on Event Site Map. Please note: barricades required for beer gardens are 8' in length.
- ☐ Complete and submit a Barrier Use Contract with this application.
- ☐ Submit the Alcohol Use Application and \$100 non-refundable fee upon approval of Event.
- ☐ Be present at City of Moscow Administrative Committee and City Council meetings regarding authorization of alcohol at Event by Resolution.

Upon approval from Council, remaining Event fees will be due, and applicant's vendor(s) are required to submit a Catering Permit application to the City Clerk/Deputy City Clerk. Any additional required paperwork outlined by the City Council Resolution and/or this process will also be due upon approval.

14. Are you planning on having a band or music? Yes ☒ No ☐

If yes, describe below any recording equipment, sound amplification equipment, etc. Submit a completed **Noise Exemption Permit Request** with this Event application.

Live music

15. Approximate number of persons, animals, and/or vehicles comprising the Event, the type(s) of animals and description of vehicles, and approximate number of participants and spectators in viewing attendance:

100

16. Do you plan on having banners, signs, or other attention-getting devices in the Event? Yes ☐ No ☒

17. Do you plan on using any designated public facilities or infrastructure for the Event? Yes ☐ No ☒
If yes, list public facilities or infrastructure (i.e. public restrooms, picnic shelters, stages, etc.).

City of Moscow Community Events Division
EVENT APPLICATION



18. Are you requesting additional City Police services for escort services, traffic, and/or crowd control?
Yes ☒ No ☐

If yes, contact City of Moscow Police Department at 208-883-7059 to discuss and see attached Fee Schedule.

19. Please use this area to include more detail or attach additional pages for additional information about Event that is pertinent for us to know.

20. Organization Sponsoring Event: Rants & Raves Brewery
21. Organization Address: 308 N Jackson Street Moscow, ID 83843
22. Organization Officers/Authorized Representatives: Neil Marzolf
23. Individual Responsible for Event Organization: Neil Marzolf
24. Individual's Address: 308 N Jackson Street Moscow, ID 83843
25. Individual's Day, Message, or Cell Phone Number: 509-304-4719
26. Individual's E-mail: rantsravesbeer@gmail.com
27. City reserves the right to alter your route if the City determines the proposed route will require significant City services and/or severely limit transit opportunities in high traffic areas. Applicant understands and agrees that the City is reserving that right? If answers no, application may be denied. Yes ☒ No ☐
28. **Submit a Site Map with this application.** Event Applications without a Site Map will not be processed. Details on a Site Map may include but are not limited to locations of desired street closures, walking routes, assembly points, start and finish points, locations of food and beverage vendors, stages, service areas, etc. A blank map of downtown Moscow is available on page 7.
29. **Residential Neighborhood Block Parties:** Provide Proof of Insurance (Requirement may be waived at Discretion of City)
30. **All other Event Types (except Public Assembly):** Provide Proof of Insurance (Required – Certificate of Insurance must include the City of Moscow as an Additional Insured and list \$500,000 as the minimum amount of general liability or \$1,000,000 if alcohol is included.)

City of Moscow Community Events Division
EVENT APPLICATION



HOLD HARMLESS AGREEMENT:

The applicant/group/organization (hereinafter "SPONSOR"), through its duly and specifically authorized agents, hereby releases City of Moscow, Idaho (hereinafter "CITY") and agrees, contracts and covenants not to bring suit and agrees to defend, hold harmless, and indemnify CITY, its officers, employees, agents and representatives from any and all claims, costs, judgments, awards, or liability to any person, including claims by SPONSOR's own agents, officers, employees and representatives, to which SPONSOR might otherwise be immune, arising from the Community Event, Block Party, Public Assembly, Parade or Sidewalk Walking Parade scheduled to occur as indicated on this application (hereinafter "Event"), including any Street Closure permitted under the terms of CITY's Policy on Street Closure. No SPONSOR shall be required to indemnify or hold harmless CITY for claims, actions and demands that arise out of CITY's sole negligence. Inspection, review and/or acceptance by CITY of any activity performed by or during the Event, or any activity or non-activity by CITY Police officers or other officers, employees, agents or representatives of CITY, shall not be grounds for avoidance of any of the covenants of defense, indemnification or hold harmless by SPONSOR on behalf of CITY.

SPONSOR acknowledges that he/she has read and understands the current Idaho Governor's Idaho Rebounds Plan which includes any existing Stay Healthy Order and/or Guidelines and has read the protocols for social/physical distancing, use of face masks/face coverings, and sanitation requirements and guidelines. SPONSOR agrees to comply with the Governor's Order and/or Guidelines and ensure that all participants will comply with the Order and/or Guidelines. SPONSOR acknowledges any and all City of Moscow Public Health Directives and/or Regulations in effect at the time of the Event. SPONSOR agrees to comply with any and all City of Moscow Public Health Directives and/or Regulations in effect at the time of the Event and ensure that all participants comply with the City of Moscow Public Health Directives and/or Regulations in effect at the time of the Event. SPONSOR agrees that if CITY determines she/he and/or any participant is not in compliance with the Governor's Orders and Guidelines and/or is not in compliance with City of Moscow Public Health Directives and/or Regulations in effect at the time of the Event, CITY reserves the right to revoke the Event permit.

I, SPONSOR, certify under penalty of perjury pursuant to the law of the State of Idaho, that the foregoing is true and correct and that I have the authority to bind the group or organization, if applicable, to this Agreement.

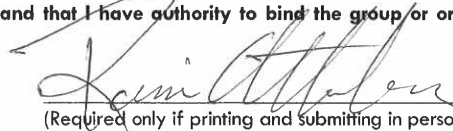
NAME: _____

DATE: 9/8/2022

EVENT SPONSOR ELECTRONIC SIGNATURE:

☐ By checking this box as an electronic signature, I agree to all the terms and conditions that apply to the Community Event /Residential Neighborhood Block Party/Public Assembly/Street Parade/Sidewalk/Pathway Event, Permitting Process, and Hold Harmless Agreement. I certify under penalty of perjury pursuant to the law of the State of Idaho that everything in the application is true and correct and that I have authority to bind the group or organization, if applicable, to this Agreement.

EVENT SPONSOR NON-ELECTRONIC SIGNATURE:


(Required only if printing and submitting in person)

The information on this form is Public Record and may be posted to a public website.
Moscow City Code Title 10, Chapter 17 is available from the City Clerk at PO Box 9203, Moscow, ID, 83843, or on the City's web page at <https://www.ci.moscow.id.us/393/City-Code>.

FOR OFFICE USE ONLY

☐ Community Event without alcohol	☒ Community Event with alcohol	☐ Street Parade Event
☐ Sidewalk/Pathway Event (fun runs, trail runs, walk-a-thons)	☐ Public Assembly – no fee (march, picket, rally, demonstration, etc.)	☐ Residential Neighborhood Block Party Event
Date App Rec'd: <u>9/2/22</u>	Fees Due: <u>\$236 -</u>	Fees Paid: _____



Imagery ©2022 Maxar Technologies, USDA/FPAC/GEO, Map data ©2022 Google 100 ft

From: [Dan Ellinwood](#)
To: [Amanda Argona](#)
Subject: RE: Oktoberfest
Date: Thursday, September 15, 2022 3:21:03 PM
Attachments: [image003.png](#)
[image004.png](#)
[image005.png](#)

Yes, thanks!

Dan Ellinwood

Division Chief / Fire Marshal
City of Moscow
Moscow Volunteer Fire Department
229 Pintail Ln.
Moscow, ID 83843
208-882-2831



From: Amanda Argona <aargona@ci.moscow.id.us>
Sent: Thursday, September 15, 2022 11:20 AM
To: Dan Ellinwood <dellinwood@ci.moscow.id.us>
Subject: FW: Oktoberfest

Hi Dan,

Does this response from the applicant satisfy the concerns/questions you had?

Amanda Argona

Community Events Manager
Moscow Farmers Market | Community Events Division
Office | 221 E. Second Street, Moscow, ID 83843
Phone | 208.883.7132 Email | aargona@ci.moscow.id.us



From: Jodie Frederick <jodiefrederick42@gmail.com>
Sent: Wednesday, September 14, 2022 11:44 AM
To: Amanda Argona <aargona@ci.moscow.id.us>
Subject: Re: Oktoberfest

CAUTION: This message originated from outside the City of Moscow's network. Exercise caution when clicking links or opening attachments. If in doubt, please contact Information Systems at extension 7004.

Here is our COI. I have talked to Neil and we will absolutely make all the required adjustments for the event. Thank you for getting them to us. We are calling Latah Sanitation today to discuss options. I believe leaving access to the entrance near Hunga Dunga is doable!
Thank you,
Jodie

On Tue, Sep 13, 2022 at 4:38 PM Amanda Argona <aargona@ci.moscow.id.us> wrote:

Hi Jodie,

I am emailing to check in on a few items:

1. Do you have your COI for the event ready for inclusion with your application?
2. Division Chief Ellinwood with the Moscow Volunteer Fire Department expressed the following concerns:
 - a. Ensuring that your event maintains the minimum amount of 20' for emergency access. He noted that in the event map it looked like the trailer was staged across the road. While items can be off-set in the street, they just need to provide 20' on one side or the other.
 - b. Have you contacted Latah Sanitation with your proposed event footprint? One work around if they want to maintain access is to leave the entry point closest to Hunga Dunga open, which will allow folks to access the recycling center by vehicle and allow them to turn around to exit as well.

We are still awaiting review by the Streets Department and Environmental Services Division, and the MVFD. Please provide the answers/assurances to points a and b as soon as possible.

Best,
Amanda

Amanda Argona
Community Events Manager
Moscow Farmers Market | Community Events Division
Office | 221 E. Second Street, Moscow, ID 83843





CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
9/16/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Leavitt Inland Pacific Insurance Services, Inc. 317 West Sixth Street Ste 107 Moscow ID 83843		CONTACT NAME: Dona Larimer PHONE (A/C, No, Ext): (208) 883-5680 FAX (A/C, No): (866) 832-4593 E-MAIL ADDRESS: dona-larimer@leavitt.com	
INSURED RANTS & RAVES BREWERY LLC 310 N JACKSON ST MOSCOW ID 83843		INSURER(S) AFFORDING COVERAGE INSURER A: Mutual of Enumclaw NAIC # 14761 INSURER B: Idaho State Insurance Fund 36102 INSURER C: INSURER D: INSURER E: INSURER F:	

COVERAGES		CERTIFICATE NUMBER: 21-22 MASTER		REVISION NUMBER:			
THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.							
INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☒ POLICY ☐ PRO-JECT ☐ LOC OTHER:	X		CPP0021614	12/5/2021	12/5/2022	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 300,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000 ENHEN \$ 1,000,000
A	AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ ALL OWNED AUTOS ☒ HIRED AUTOS ☒ SCHEDULED AUTOS ☒ NON-OWNED AUTOS	X		CPP0021614	12/5/2021	12/5/2022	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ Medical payments \$ 5,000
A	☐ UMBRELLA LIAB ☒ EXCESS LIAB DED \$ RETENTION \$			UMC0005797	12/5/2021	12/5/2022	EACH OCCURRENCE \$ AGGREGATE \$
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N	N/A	669274	1/13/2022	1/13/2023	PER STATUTE OTH-ER E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$
DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required) City of Moscow is listed as an additional insured in reference to the General Liability Policy above. RE: Moscow Brewing District Oktoberfest, October 15, 2022 N Jackson Street-closure and C street-closure							

CERTIFICATE HOLDER City of Moscow 206 E Third Street Moscow, ID 83843	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE Dona Larimer/DOLARI
---	---

ACORD 25 (2014/01)
INS025 (201401)

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NOISE EXEMPTION PERMIT REQUEST

Moscow City Code 10-11-2

(Please allow at least three business days in which to process this request)

Requested Event Date(s): October 15, 2022 Begin time: 2:00pm End time: 6:00pm
Event Location: 308 N Jackson Street / C Street Moscow

Amplified Music (DJ, party, etc.) ☐ No ☒ Yes

Alcoholic Beverages Available ☐ No ☒ Yes - Purchaser: _____

(Marking this box does not mean your request will be denied)

(If hosted or catered, name of serving organization)

Live Band Performing ☐ No ☒ Yes - Group: _____

Describe the event: Moscow Brewing District Oktoberfest

(use back of this form if more space is needed)

Name of requesting person/Group/Organization: Rants & Raves Brewery

Person responsible for Group or Organization: Neil Marzolf

Requesting Person's Address: 308 N Jackson Street Moscow

Phone Number: 509-304-4719

Email Address: rantsravesbeer@gmail.com

Daytime phone number is required

Permits will be returned by email unless otherwise requested

Responsible person available AT AND DURING this event: Neil Marzolf

Cell- or contact-phone during event: 509-304-4719

Your signature is unconditional acceptance of all terms and conditions. This permit may be modified or revoked by City at any time if permit conditions are violated. Read the following carefully:

The applicant/group/organization hereby agrees to indemnify and hold harmless City of Moscow, Idaho from all claims, actions and demands of any kind whatsoever related to and/or arising out of the activity(ies) specified in this application and does hereby accept all risk and responsibility for any damage(s) stemming from such activity. Every Applicant requesting a noise Exemption Permit shall cooperate with law enforcement by adjusting the noise level in the event of any citizen complaint(s). In the event of non-compliance, law enforcement may revoke this permit. No applicant/group/organization shall be required to indemnify or hold harmless City of Moscow, Idaho for claims, actions and demands that arise out of City's sole negligence.

Requesting Person's Signature: _____

Date: 9-8-22



APPROVED



DENIED

Date permit valid: 10/15/2022

Hours permit valid: 2pm-6pm

Noise level (dba) shall not exceed 85 Dba

at ☒ source at ☐ property line

Other Conditions: _____

James Fry, Jr.
James Fry, Jr. (Sep 13, 2022 14:00 PDT)

Police Chief or Designee (208) 883-7054

Community Events Division Event Application Review

Moscow Brewery District Oktoberfest

10/15/22 2-6pm

Event Name

Date(s)/Time(s)

DEPARTMENT/DIVISION DESIGNEE

EVENT(S) APPROVED/DENIED

James Fry Jr.

James Fry Jr. (Sep 13, 2022 13:59 PDT)

Moscow Police Department

Officer presence required?

☐ Yes ☒ No ☐ N/A

Officers available?

☒ Approve ☐ Deny
☐ Yes ☐ No ☒ N/A

Dan Ellinwood

Dan Ellinwood (Sep 15, 2022 15:21 PDT)

Moscow Volunteer Fire Department

☒ Approve ☐ Deny

David R. Schott

David R. Schott (Sep 8, 2022 16:34 PDT)

Parks and Recreation Department

☒ Approve ☐ Deny

Kyle Rainer

Kyle Rainer (Sep 9, 2022 09:26 PDT)

Community Development-Engineering Division

☒ Approve ☐ Deny

[Signature]

Public Works-Environmental Services Division

☒ Approve ☐ Deny

Steven Schulte

Steven Schulte (Sep 15, 2022 12:02 PDT)

Public Works-Streets Department

Street closure required?

☒ Yes ☐ No ☐ N/A

ITD permit required?

☒ Approve ☐ Deny
☐ Yes* ☒ No ☐ N/A

*Application will remain pending until ITD grants applicant a permit

Time of street closure?

1 pm 7 pm
 Start End

Fees?

\$136.00
 Daytime Nighttime

Kelsey Manning

Kelsey Manning (Sep 16, 2022 09:37 PDT)

City Clerk/Deputy City Clerk

City of Moscow Community Events Division
ALCOHOL USE APPLICATION



Required for Events requesting Alcohol Use in the Moscow Downtown Central Business
Zoning District or a Moscow Parks Facility.

City Council has the right to deny this application, but applicants may still move forward
with their approved Event without alcohol.

Timeline for requesting Alcohol Use:

1. At least two months prior to Event, applicant submits Event Application or Parks Reservation for review.
2. Upon approval of Application or Reservation, applicant submits:
 - a. Alcohol Use application
 - b. Pays \$100 non-refundable Alcohol Use fee
 - c. Name(s) of licensed alcohol provider(s)
 - d. Events in a Moscow Park Facility also include:
 - i. Location of the beer/wine garden during the event with size dimensions, entry and exit points, and serving location. Provide as much detail as possible.
3. Staff drafts a Resolution according to the Event and communicates with applicant on security and insurance requirements.
4. Applicant must be present at Administrative Committee meeting (meetings are held on the 2nd and 4th Mondays of each month pending no holiday delays).
5. Applicant must be present at City Council meeting (meetings are held on the 1st and 3rd of each month pending no holiday delays).
6. Upon approval, applicant pays any remaining fees.

Moscow Brewing District
Event Name: Oktoberfest Event Date(s): 10/15/2022
Event Location: N Jackson Street
Event Start time: 2:00pm Event End time: 6:00pm
Neil Marzolf
Individual responsible per Event Application/Parks Reservation: _____

By signing this Alcohol Use application, applicant understands that their Event may not have alcohol unless approved by City Council, and that City Council has the right to deny Alcohol Use applications. Applicant also understands that the \$100 fee is non-refundable regardless of the decision issued by City Council.

[Signature]
Signature of Individual responsible for Event

9-8-22
Date

Date Received: 9/8/22

Date non-refundable fee paid: 9/16/22

COMMITTEE STAFF REPORT

DATE: Monday, September 26, 2022



RESPONSIBLE STAFF

Todd Drage, Engineering Technician

ADDITIONAL PRESENTER(S)

OTHER RESOURCES

AGENDA ITEM TITLE

Picabu Estates 1st Addition - Engineering Variance (ACTION ITEM) - Todd Drage

DESCRIPTION

The developer of the Picabu Estates Subdivision, Mark Pica, has requested the reduction in width of the pathway running north/south on the west side of the Picabu Street from the current 10 foot width to the standard sidewalk width of 5 feet. The City Pathways Master Plan calls for a pathway to be located along Lanny Drive as well as extending north from the Picabu Street/Lanny Drive intersection. When the Pathways Commission and the Parks and Recreation Commission reviewed the Picabu Estates subdivision during the platting process in 2016 it was determined that because Lanny Drive was designated as a collector, the dedicated bike lanes with no on-street parking would meet the bicycle needs and is within the spirit of the Master Plan. The developer subsequently expressed concern with the lack of on-street parking in the subdivision and in lieu of bike lanes on Lanny Drive a 10-foot wide pathway on the south side of the street was approved instead. The 10 foot wide path was also extended to the north along the west side of Picabu Street, which terminates into undeveloped property to the north. City staff from Engineering, Planning, and Parks and Recreation reviewed the proposal and determined that if a future pathway were to be extended to the northeast of the subject property, that pedestrians and bicyclists would be able to use the sidewalks and Picabu Street for access and that the short segment of 10-foot wide pathway was not needed. Therefore, it is staff's recommendation that the Council approve the reduction of the pathway on Picabu Street from 10 feet to the standard 5-foot width.

STAFF RECOMMENDATION

Recommend approval of the engineering variance allowing the applicant to reduce the required sidewalk width along the west side of Picabu Street from 10 feet wide to 5 feet wide per City Standard, or provide staff with further direction.

PROPOSED ACTIONS

PROPOSED ACTIONS: Recommend approval of the engineering variance allowing the applicant to reduce the required sidewalk width along the west side of Picabu Street from 10 feet wide to 5 feet wide per City Standard, or provide staff with further direction.

FISCAL IMPACT

N/A

PERSONNEL IMPACT

N/A

ATTACHMENTS

1. Picabu Estates - Location and Civil-
2. Picabu Sidewalk

PICABU ESTATES CITY OF MOSCOW LATAH COUNTY, IDAHO

Section of 10' wide sidewalk
on the west side of Picabu
Street

BASIS OF ELEVATION

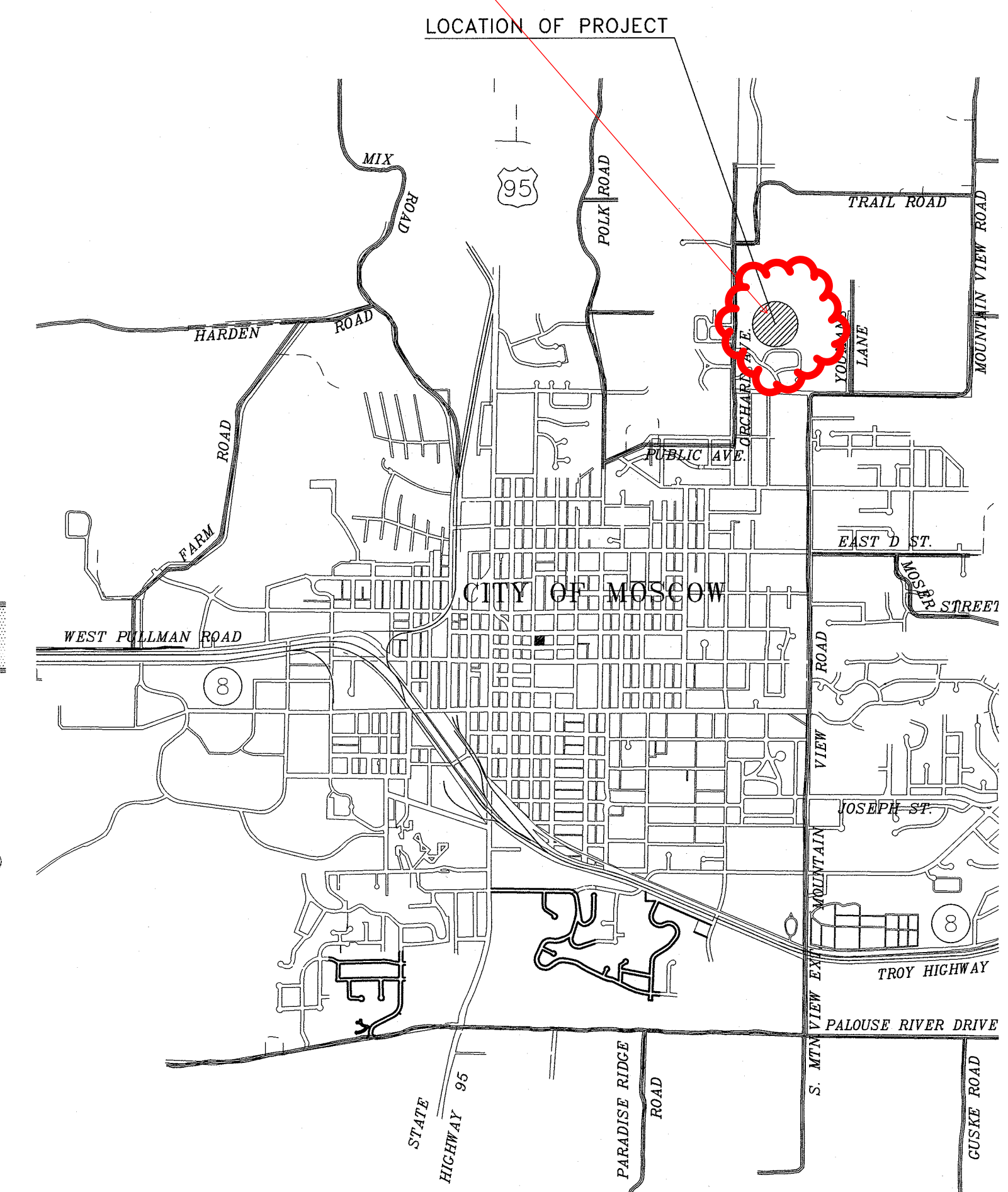
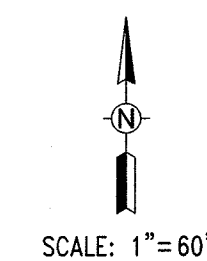
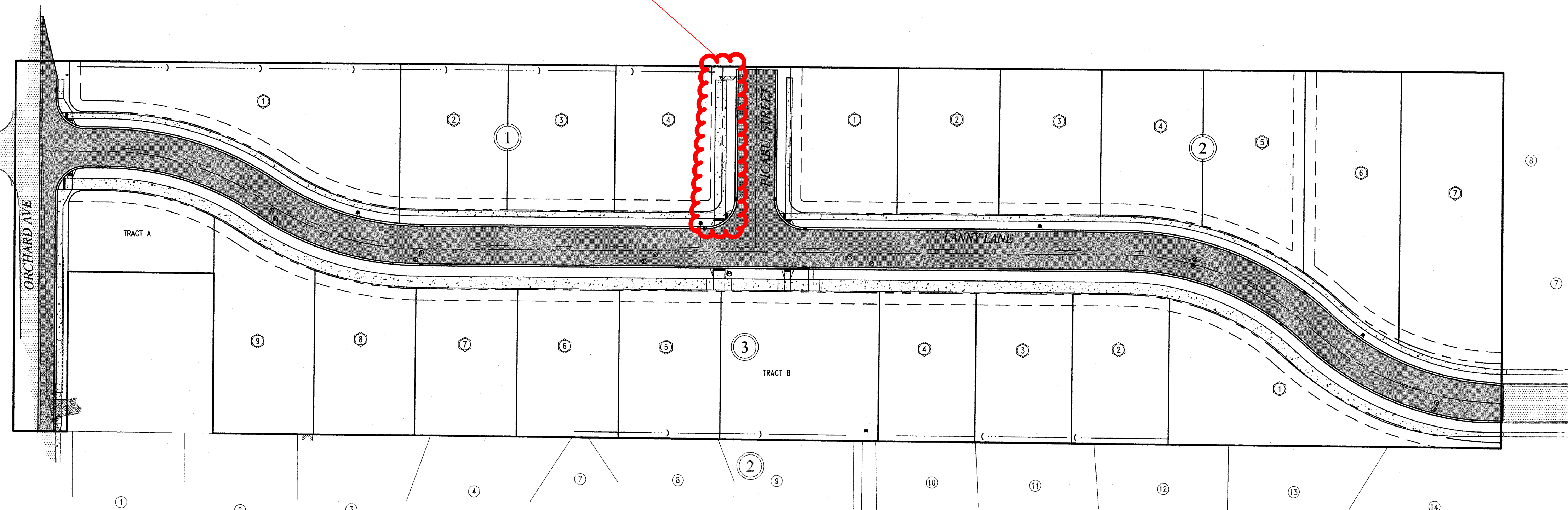
THE BASIS OF ELEVATION FOR THIS PROJECT IS NAVD88, ESTABLISHED BY GPS.
THE BASE POSITION BEING CORRECTED BY NGS ONLINE POSITIONING USER
SERVICE (OPUS).

DRAWING INDEX

Sheet Number	Sheet Title
C1	COVER SHEET
C2	EROSION CONTROL AND GRADING PLAN
C3	UTILITY LAYOUT PLAN
C4	PLAN AND PROFILE - LANNY LANE STA 0+00 - 4+60
C5	PLAN AND PROFILE - LANNY LANE STA 4+60 - 9+40
C6	PLAN AND PROFILE - LANNY LANE STA 9+40 - END
C7	PLAN AND PROFILE - ORCHARD AVENUE AND PICABU STREET
C8	GENERAL NOTES AND DETAILS
C9	FRANCHISE UTILITY PLAN



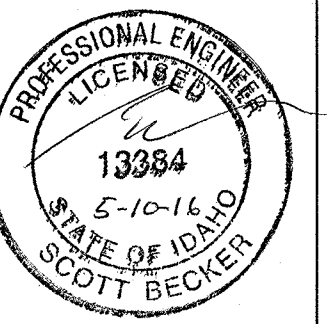
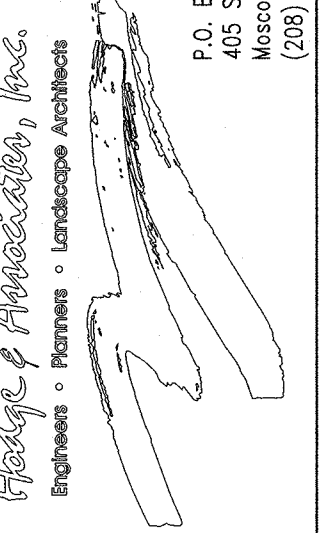
Picabu Estates 1st Addition Location



VICINITY MAP



Know what's below.
Call before you dig.



PICABU ESTATES
COVER SHEET
MARK AND ROBYN PICA
10292 N. IDAHO ROAD
POSTFALLS, IDAHO 83854-6075
(208) 691-4577

Designed By:	SB
Drafted by:	SW
Checked by:	SB
File Name:	3734 COVER.dwg
Tab:	COVER
Layer Style:	STANDARD
Plot Style:	OCE.CTB
Project:	3734-07-15
Date:	5/10/2016

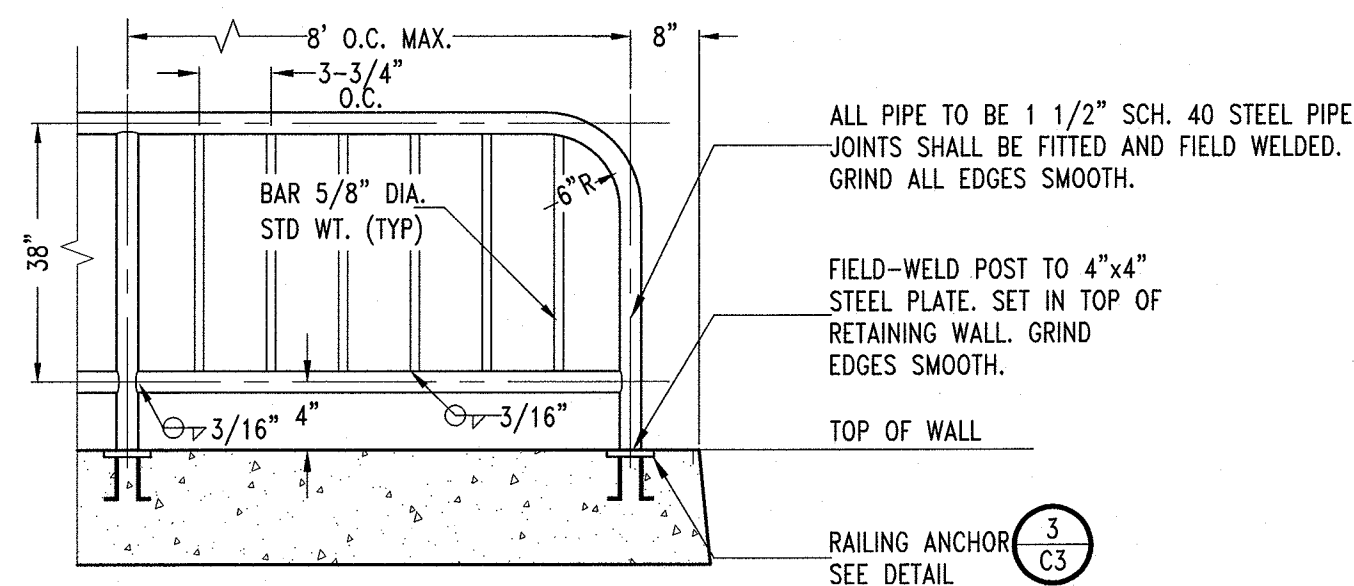
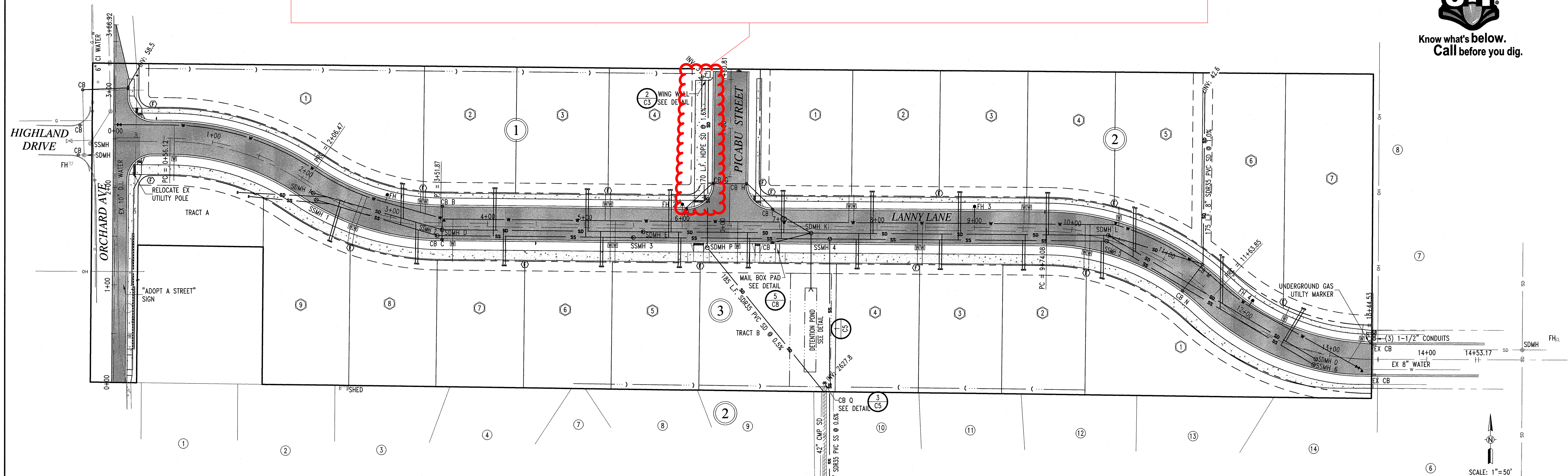
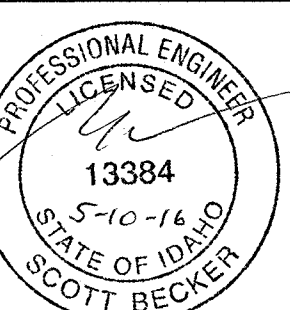
C1

10' wide sidewalk as approved in the Civil Design Plan Set to be reduced to 5' wide to match the opposite side of street and the City's 36' Local Street Standard



Know what's below.
Call before you dig.

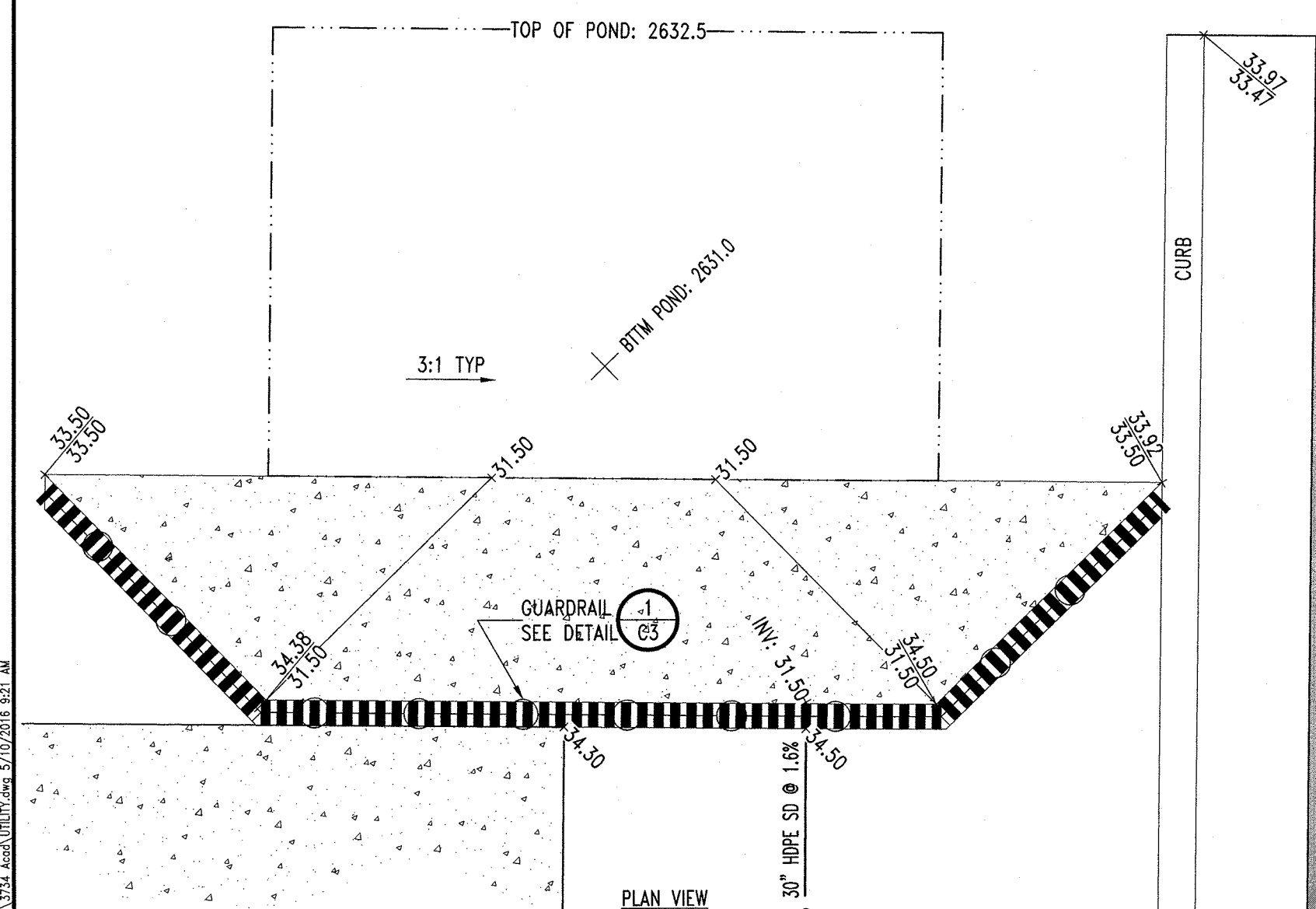
Hodge & Associates, Inc.
Engineers • Planners • Landscape Architects
P.O. Box 8728
405 S. Washington Street
Moscow, Idaho 83843
(208) 882-5260



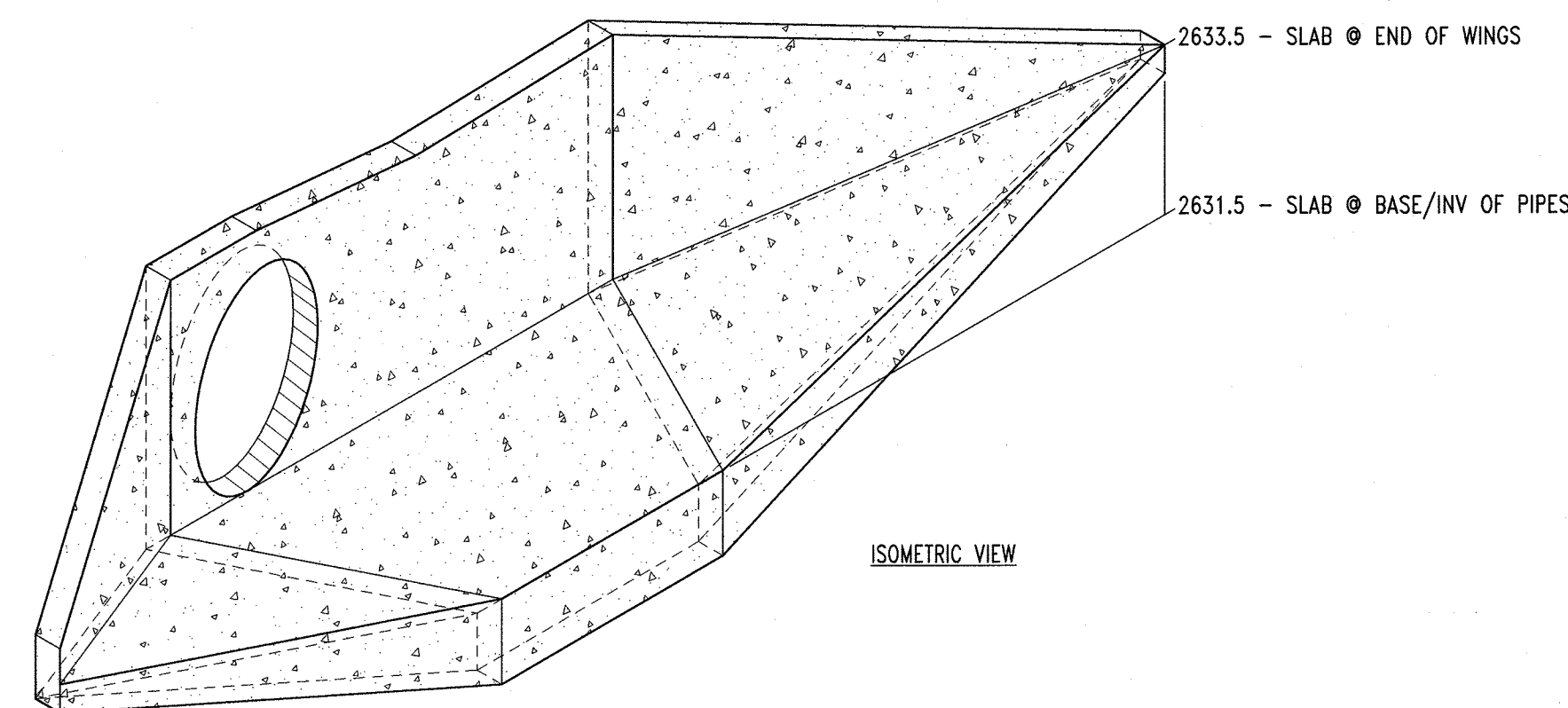
GUARD RAIL

NTS

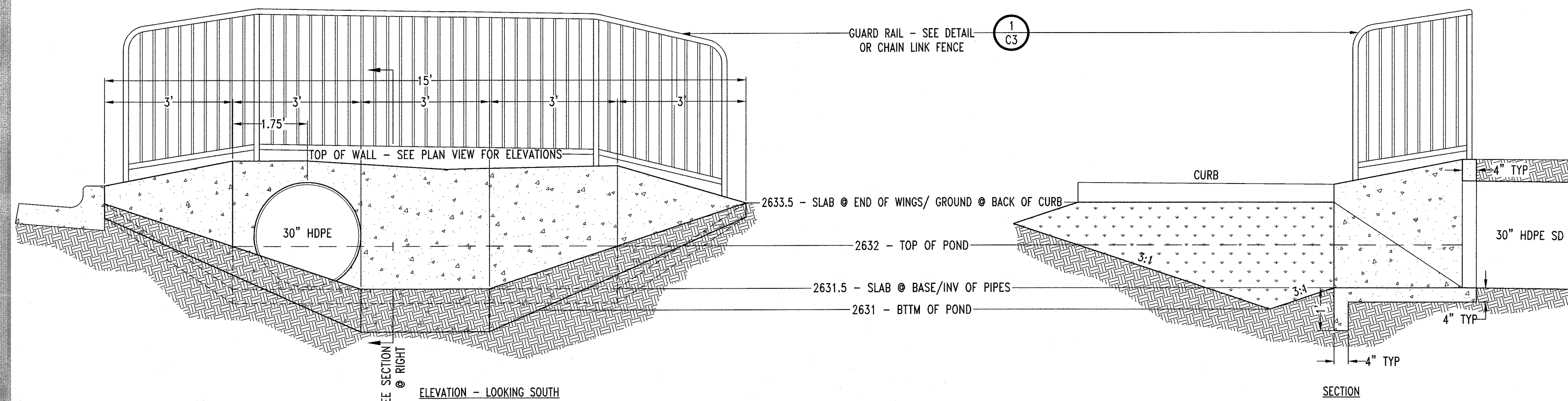
1
C3



PLAN VIEW



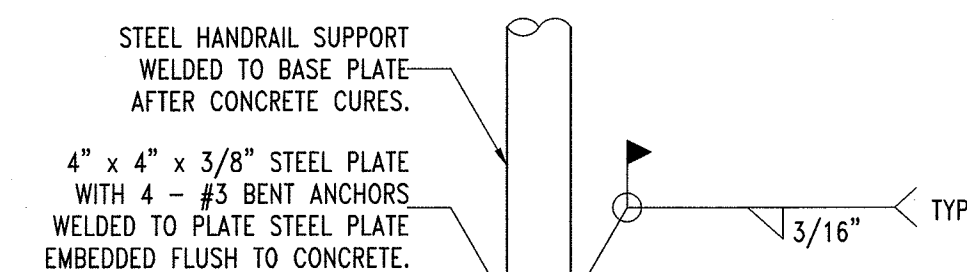
ISOMETRIC VIEW



WING WALL DETAILS

NTS

2
C3



RAILING ANCHOR

NTS

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C3

LEGEND

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BLOCK NUMBER

LOT NUMBER

MANHOLE

CATCH BASIN

CLEAN OUT

FIRE HYDRANT

THRUST BLOCK

WATER VALVE

WATER METER

POWER POLE

LIGHT POLE

FRANCHISE UTILITY PEDESTAL-SEE SHEET C9

PROPERTY LINE

LOT LINE

RIGHT-OF-WAY

CENTER LINE OF RIGHT-OF-WAY

CROWN OF ROAD

EASEMENT

SANITARY SEWER LINE

STORM DRAIN LINE

WATER LINE

OVERHEAD UTILITY LINE

DRAINAGE DITCH

CURB

CONCRETE PAVING

ASPHALT PAVING

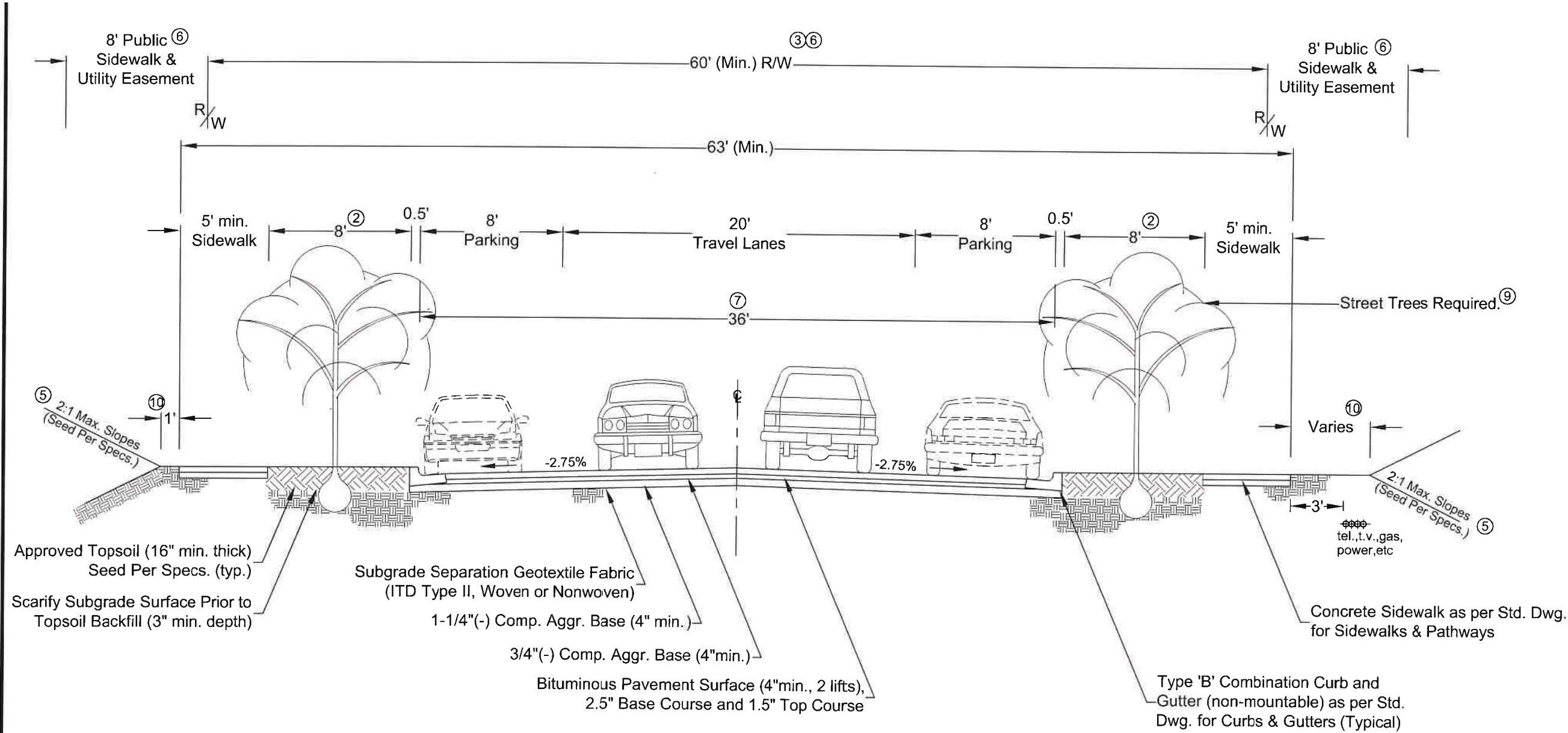
PICABU ESTATES
UTILITY LAYOUT PLAN

MARK AND ROBYN PICA
10292 N. IDAHO ROAD
POSTFALLS, IDAHO 83854-6075
(208) 691-4577

Designed By: SB
Drafted by: SW
Checked by: SB
File Name: 3734 UTILITY.dwg
Tab: UTILITY
Layer Style: STANDARD
Plot Style: DEFAULT.ctb
Project: 3734-07-15
Date: 5/10/2016

C3

36' Local Street Standard with 5' wide sidewalk on both sides of the street



Notes:

1. This alternate street section can be used for all streets not classified as Collector or Arterial.
2. The eight foot (8') wide green strip may be narrowed to a minimum width of five feet (5') in areas of excessive cuts and fills, as approved by City Engineer.
3. Center streets in platted right-of-way, unless approved otherwise by the City Engineer. Additional right-of-way shall be required as necessary to accommodate topography, utilities, or other needs as determined by the City Engineer.
4. Compact all subgrade and base aggregate to 95% of AASHTO T99 max. proctor density.
5. Seed all roadside backfill and excavations as per Standard Specifications.
6. Wider platted rights-of-way allow narrower easements, proportionately. Additional easements may be required as necessary.
7. Maximum street centerline profile grade shall equal 10.0% or as approved by the City Engineer.
8. Subgrade underdrain systems are required in inherently "wet" areas, as specified by the City Engineer, see Standard Drawing for Subsurface Drainage.
9. Tree selection and planting shall comply with the City's Arboricultural Standards and Specification Guide.
10. This dimension shall be four feet (4') where standard franchise utility pedestals (excluding transformers) are to be located and shall be six feet (6') where pedestals and an AVISTA power transformer pad is required (see Standard Drawing for Franchise Utility Details).

REVISIONS	
DATE	DESCRIPTION
2-4-2021	Switched sheets 1a and 1b

PROFESSIONAL ENGINEER
LICENSED
14816
3-2-21
STATE OF IDAHO
BRIAN SCOTT

DRAFTED BY: C. Edwards	CHECKED BY: K. Lilly	DRAWING SCALE: NTS	DATE: 3-31-2014
---------------------------	-------------------------	-----------------------	--------------------

Alternate Local Street
(36' Street)

CITY OF MOSCOW
ENGINEERING DEPARTMENT

DRAWING NUMBER:
1b

Pica Construction

City of Moscow

Attention: Todd Drage

September 19, 2022

To Whom It May Concern:

Pica Construction is requesting a variance on the sidewalk located on the west side of Picabu Street, section 3C. Our request is to reduce the width of the sidewalk on this dead-end street from the proposed ten-foot recommendation to five feet.

The reason behind our request is that Picabu street is a dead-end street with a 30" culvert. It is not an area conducive to cyclists. Besides, the cyclists we have observed on Lanny Lane are riding on the street, rather than utilizing the ten-foot sidewalk on the southside of the street. A ten-foot sidewalk would also intrude over 6 1/2 feet onto a client's property, shortening the driveway, and possibly forcing people to park on the street.

We appreciate your consideration of our request. We believe this request is in the best interest of the Picabu neighborhood.

Sincerely,

A handwritten signature in cursive script, appearing to read "Mark Pica".

**Mark Pica, Owner
Pica Construction**

COMMITTEE STAFF REPORT

DATE: Monday, September 26, 2022



RESPONSIBLE STAFF

Scott Bontrager, City Engineer

ADDITIONAL PRESENTER(S)

OTHER RESOURCES

AGENDA ITEM TITLE

Booster Station Replacement Phase II Rebid - Bid Results (ACTION ITEM) - Scott Bontrager

DESCRIPTION

The Booster Station Replacement - Phase II Rebid project includes the construction of two (2) new booster pump stations located near the Indian Hills and Ponderosa Sub-divisions. The work will include new Concrete Masonry Units (CMU) block buildings, site improvements, piping, pumps, electrical components, and controls. The City published an advertisement for bids on August 13, 2022 and the Engineer's Estimate for construction is \$4,641,900.00. Bids were opened on Tuesday, September 13, 2022. Three responsive bids were received, with bids ranging from \$4,231,000.00 to \$4,856,398.00. Of those, the lowest responsive bid was submitted by TML Construction, Inc. with a bid of \$4,231,000. A bid analysis is included in the Committee packet.

STAFF RECOMMENDATION

Accept the low bid from TML Construction, Inc., award the contract for \$4,231,000, and authorize staff approval of construction change orders in an amount not to exceed 10% of the contract amount.

PROPOSED ACTIONS

PROPOSED ACTIONS: Recommend acceptance of the bid from TML Construction, Inc., award the contract for \$4,231,000, and authorize staff approval of construction change orders in an amount not to exceed 10% of the contract amount, or provide staff further direction.

FISCAL IMPACT

Funds for the Booster Station Replacement - Phase II Rebid project would be expended from the Booster Stations Program 320-220-770-54. Expenditure of \$4,231,000 plus an additional 10% allocated for possible change orders to fund contract with TML Construction, Inc. for the construction of the project.

PERSONNEL IMPACT

City staff will administer construction contract and inspection.

ATTACHMENTS

1. Booster Station Replacement - Phase II Rebid_Bid Review
2. Booster Station Replacement Phase II Rebid - Construction Agreement with attachments _ final

September 15, 2022

Scott Bontrager
City of Moscow, Idaho
504 S. Washington Street
Moscow, ID 83843

RE: BOOSTER STATION REPLACEMENT – PHASE II REBID – BID REVIEW

Dear Scott:

On September 13, 2022, the City of Moscow received three bids for the Booster Station Replacement – Phase II ReBid project. The apparent low bid was submitted by TML Construction, Inc. with a total Bid price of \$4,231,000.00. For comparison, the Engineer's Opinion of Probable Cost for the project is \$4,641,900.00 with contingency. A summary of the bids received is included below:

Bidder	Base Bid Total
TML Construction, Inc.	\$4,231,000.00
S & L Underground, Inc.	\$4,785,1000.00
IMCO General Construction, Inc.	\$4,856,398.00

We focused our review on the base bid cost and the contents of the bid packets to ensure that the required information was present. The required information was outlined in the Advertisement to Bid, Bidder's Checklists, Instructions to Bidders, and Bid Form, which were all provided in Volume I of the Contract Documents. We have reviewed the bids to determine general compliance with the administrative requirements of the bidding phase (i.e., whether each bid received was responsive) based on the following:

- Bid received on time in a properly sealed envelope.
- Addenda properly acknowledged.
- Bid Form was completed in general conformance with the Instructions to Bidders.
- Bid Security signed and included.
- Bidder's Idaho Contractor License number included.
- Bid signed.
- Statutory Naming of Subcontractors Form completed (Plumbing, Electrical, HVAC are listed).
- Non-Collusion, and Anti-Discrimination completed.
- SRF AIS documentation included/acknowledged? (Form AIS-1).

Our review did not include the following:

- Verification of the Bidder's business legal status,
- The signatory's authority to sign, and
- Other possible legal reasons for considering the bids unresponsive.

The bid documents for the lowest bid, from TML Construction, Inc., appear to be complete and responsive. The two next lowest bids also appear to be complete and responsive.

J-U-B verified the status of the Idaho Public Works license for all three Bidders. We reviewed the license status on the Idaho Division of Building Safety (DBS) Public Works Contractor License Search (eTRAKiT) website on September 13, 2022, for all listed contractors and the apparent low bidder's subcontractors.

We additionally looked up the bidders on the System for Award Management (SAM) website and confirmed that they have no active exclusions. No current registration has been identified for TML Construction on the site. Registration summaries available from the SAM website are attached.

Based on this evaluation, it is our opinion that TML Construction, Inc. is the lowest responsive bidder, and we recommend that they be considered for award of the contract. Based on our review of the contract documents, and upon completion of further review and concurrence by City legal staff and Idaho Department of Environmental Quality, we recommend the City consider awarding the project to TML Construction, Inc. for a total contract price of Four Million Two Hundred Thirty-One Thousand and No/100 Dollars (\$4,231,000.00). A copy of TML Construction, Inc.'s bid from and the Bid Evaluation are enclosed for reference.

Please conduct any additional review deemed necessary and provide your authorization of Award and we will move forward with the preparation of the Notice of Award and Contract Documents for TML Construction, Inc.

If you would like to discuss our review or have additional questions, please do not hesitate to contact me at (208) 762-8787.

Sincerely,



Michelle L. Johnson, P.E.
Project Manager
J-U-B ENGINEERS, Inc.

Cc: Hannah Erickson, IDEQ – Hannah.Erickson@deq.idaho.gov

Enclosures



S & L UNDERGROUND INC

Unique Entity ID YDT6AYRDNGX5	CAGE / NCAGE 1WT18	Purpose of Registration All Awards
Registration Status Active Registration	Expiration Date Nov 14, 2022	
Physical Address 66304 Highway 2 Bonners Ferry, Idaho 83805 United States	Mailing Address P.O. Box 1952 Bonners Ferry, Idaho 83805-1952 United States	

Business Information

Doing Business as (blank)	Division Name (blank)	Division Number (blank)
Congressional District Idaho 01	State / Country of Incorporation Arizona / United States	URL (blank)

Registration Dates

Activation Date Oct 18, 2021	Submission Date Oct 15, 2021	Initial Registration Date Jan 10, 2002
--	--	--

Entity Dates

Entity Start Date Feb 16, 1999	Fiscal Year End Close Date Dec 31
--	---

Immediate Owner

CAGE (blank)	Legal Business Name (blank)
------------------------	---------------------------------------

Highest Level Owner

CAGE (blank)	Legal Business Name (blank)
------------------------	---------------------------------------

Executive Compensation

Registrants in the System for Award Management (SAM) respond to the Executive Compensation questions in accordance with Section 6202 of P.L. 110-252, amending the Federal Funding Accountability and Transparency Act (P.L. 109-282). This information is not displayed in SAM. It is sent to USAspending.gov for display in association with an eligible award. Maintaining an active registration in SAM demonstrates the registrant responded to the questions.

Proceedings Questions

Registrants in the System for Award Management (SAM) respond to proceedings questions in accordance with FAR 52.209-7, FAR 52.209-9, or 2.C.F.R. 200 Appendix XII. Their responses are not displayed in SAM. They are sent to FAPIIS.gov for display as applicable. Maintaining an active registration in SAM demonstrates the registrant responded to the proceedings questions.

Exclusion Summary

Active Exclusions Records?

No

SAM Search Authorization

I authorize my entity's non-sensitive information to be displayed in SAM public search results:

Yes

Entity Types

Business Types

Entity Structure Corporate Entity (Not Tax Exempt)	Entity Type Business or Organization	Organization Factors (blank)
Profit Structure For Profit Organization		

Socio-Economic Types

SBA Certified Hub Zone Firm

Entrance Date: **Jul 11, 2005**

Exit Date: **(blank)**

Check the registrant's Reps & Certs, if present, under FAR 52.212-3 or FAR 52.219-1 to determine if the entity is an SBA-certified HUBZone small business concern. Additional small business information may be found in the SBA's Dynamic Small Business Search if the entity completed the SBA supplemental pages during registration.

Financial Information

Accepts Credit Card Payments

No

Debt Subject To Offset

No

EFT Indicator

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CAGE Code

1WT18

EFT Indicator

1952

CAGE Code

7NXM3

Points of Contact

Electronic Business



Shem Johnson

P.O. Box 1952

66304 HWY 2

Bonnerr's Ferry, Idaho 83805

United States

Margo Johnson

66304 HWY 2

P.O. Box 1952

Bonnerr's Ferry, Idaho 83805

United States

Government Business



Shem Johnson

P.O. Box 1952

66304 HWY 2

Bonnerr's Ferry, Idaho 83805

United States

Shem Johnson

P.O. Box 1952

66304 HWY 2

Bonnerr's Ferry, Idaho 83805

United States

Past Performance



Shem Johnson

P.O. Box 1952

66304 HWY 2

Bonnerr's Ferry, Idaho 83805

United States

Shem Johnson

66304 HWY 2

P.O. Box 1952

Bonnerr's Ferry, Idaho 83805

United States

Service Classifications

NAICS Codes

Primary

Yes

NAICS Codes

237110

115310

236115

236116

236117

236118

236210

NAICS Title

Water And Sewer Line And Related Structures Construction

Support Activities For Forestry

New Single-Family Housing Construction (Except For-Sale Builders)

New Multifamily Housing Construction (Except For-Sale Builders)

New Housing For-Sale Builders

Residential Remodelers

Industrial Building Construction

236220	Commercial And Institutional Building Construction
237120	Oil And Gas Pipeline And Related Structures Construction
237130	Power And Communication Line And Related Structures Construction
237210	Land Subdivision
237310	Highway, Street, And Bridge Construction
237990	Other Heavy And Civil Engineering Construction
238110	Poured Concrete Foundation And Structure Contractors
238120	Structural Steel And Precast Concrete Contractors
238130	Framing Contractors
238140	Masonry Contractors
238150	Glass And Glazing Contractors
238160	Roofing Contractors
238170	Siding Contractors
238190	Other Foundation, Structure, And Building Exterior Contractors
238210	Electrical Contractors And Other Wiring Installation Contractors
238220	Plumbing, Heating, And Air-Conditioning Contractors
238290	Other Building Equipment Contractors
238310	Drywall And Insulation Contractors
238320	Painting And Wall Covering Contractors
238330	Flooring Contractors
238340	Tile And Terrazzo Contractors
238350	Finish Carpentry Contractors
238390	Other Building Finishing Contractors
238910	Site Preparation Contractors
238990	All Other Specialty Trade Contractors

Disaster Response

Yes, this entity appears in the disaster response registry.

Yes, this entity require bonding to bid on contracts.

Bonding Levels	Dollars
Construction Aggregate	\$10,000,000.00
Construction Per Contract	\$10,000,000.00

States
Idaho

Counties
ID: Kootenai, Boundary, Bonner

Metropolitan Statistical Areas
(blank)



IMCO GENERAL CONSTRUCTION, INC.

Unique Entity ID NPVFUUN43795	CAGE / NCAGE 0HVFH2	Purpose of Registration All Awards
Registration Status Active Registration	Expiration Date Aug 5, 2023	
Physical Address 2116 Buchanan Loop Ferndale, Washington 98248-9801 United States	Mailing Address 2116 Buchanan Loop Ferndale, Washington 98248-9801 United States	

Business Information

Doing Business as (blank)	Division Name (blank)	Division Number (blank)
Congressional District Washington 01	State / Country of Incorporation Washington / United States	URL (blank)

Registration Dates

Activation Date Aug 9, 2022	Submission Date Aug 5, 2022	Initial Registration Date Mar 5, 2002
---------------------------------------	---------------------------------------	---

Entity Dates

Entity Start Date Apr 17, 1979	Fiscal Year End Close Date Dec 31
--	---

Immediate Owner

CAGE (blank)	Legal Business Name (blank)
------------------------	---------------------------------------

Highest Level Owner

CAGE (blank)	Legal Business Name (blank)
------------------------	---------------------------------------

Executive Compensation

Registrants in the System for Award Management (SAM) respond to the Executive Compensation questions in accordance with Section 6202 of P.L. 110-252, amending the Federal Funding Accountability and Transparency Act (P.L. 109-282). This information is not displayed in SAM. It is sent to USAspending.gov for display in association with an eligible award. Maintaining an active registration in SAM demonstrates the registrant responded to the questions.

Proceedings Questions

Registrants in the System for Award Management (SAM) respond to proceedings questions in accordance with FAR 52.209-7, FAR 52.209-9, or 2.C.F.R. 200 Appendix XII. Their responses are not displayed in SAM. They are sent to FAPIIS.gov for display as applicable. Maintaining an active registration in SAM demonstrates the registrant responded to the proceedings questions.

Exclusion Summary

Active Exclusions Records?

No

SAM Search Authorization

I authorize my entity's non-sensitive information to be displayed in SAM public search results:

Yes

Entity Types

Business Types

Entity Structure Corporate Entity (Not Tax Exempt)	Entity Type Business or Organization	Organization Factors (blank)
Profit Structure For Profit Organization		

Socio-Economic Types

Check the registrant's Reps & Certs, if present, under FAR 52.212-3 or FAR 52.219-1 to determine if the entity is an SBA-certified HUBZone small business concern. Additional small business information may be found in the SBA's Dynamic Small Business Search if the entity completed the SBA supplemental pages during registration.

Financial Information

Accepts Credit Card Payments
No

Debt Subject To Offset
No

EFT Indicator
0000

CAGE Code
0HVV2

Points of Contact**Electronic Business**


Tyler Kimberley

**2116 Buchanan Loop
Ferndale, Washington 98248
United States**

TYLER Kimberley

2116 Buchanan Loop
Ferndale, Washington 98248
United States

Government Business


Tyler Kimberley

**2116 Buchanan Loop
Ferndale, Washington 98248
United States**

TYLER KIMBERLEY

2116 Buchanan Loop
Ferndale, Washington 98248
United States

Past Performance


Tyler Kimberley

**2116 Buchanan Loop
Ferndale, Washington 98248
United States**

Service Classifications**NAICS Codes**

Primary	NAICS Codes	NAICS Title
Yes	237990	Other Heavy And Civil Engineering Construction
	221310	Water Supply And Irrigation Systems
	236210	Industrial Building Construction
	236220	Commercial And Institutional Building Construction
	237110	Water And Sewer Line And Related Structures Construction
	237120	Oil And Gas Pipeline And Related Structures Construction
	237130	Power And Communication Line And Related Structures Construction
	237310	Highway, Street, And Bridge Construction
	238110	Poured Concrete Foundation And Structure Contractors
	238120	Structural Steel And Precast Concrete Contractors
	238190	Other Foundation, Structure, And Building Exterior Contractors
	238290	Other Building Equipment Contractors
	238910	Site Preparation Contractors
	238990	All Other Specialty Trade Contractors
	332312	Fabricated Structural Metal Manufacturing
	333923	Overhead Traveling Crane, Hoist, And Monorail System Manufacturing
	488210	Support Activities For Rail Transportation

531190

Lessors Of Other Real Estate Property

532490

Other Commercial And Industrial Machinery And Equipment Rental And Leasing

541330

Engineering Services

562910

Remediation Services

Disaster Response

Yes, this entity appears in the disaster response registry.

Yes, this entity require bonding to bid on contracts.

Bonding Levels	Dollars
Construction Aggregate	\$175,000,000.00
Construction Per Contract	\$125,000,000.00

States

Idaho

Montana

Washington

Counties

(blank)

Metropolitan Statistical Areas

(blank)

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

City of Moscow Attn: City Clerk
504 S. Washington Street
Moscow, Idaho 83843

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

- A. Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged:

<u>Addendum No.</u>	<u>Addendum Date</u>
<u>Addendum 1</u>	<u>9/2/22</u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

- B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in SC-4.02 as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in SC-4.06 as containing reliable "technical data."
- E. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and

procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.

- F. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, test, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder safety precautions and programs incident thereto.
- G. Based on the information and observations referred to in Paragraph 3.01.E above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- H. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- I. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and is not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

BASE BID – BOOSTER STATION REPLACEMENT– PHASE II REBID

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
1	Indian Hills Booster Pump Station	1	LS	\$ 2,081,000	\$ 2,081,000.00
2	Ponderosa Booster Pump Station	1	LS	\$ 2,150,000	\$ 2,150,000.00
BASE BID TOTAL					\$ 4,231,000

BASE BID TOTAL PRICE four million two hundred thirty one thousand
(use words)

- 5.02 Major Equipment Items: Certain items of major equipment to be provided under this Contract are tabulated in the Schedule of Manufacturers and Suppliers of Major Equipment and Material Items. In connection with the tabulation of major items of equipment included in the lump sum base bid, the following shall apply:
- A. The lump sum bid shall include the installed prices from those manufacturers listed by the Owner as "Base Bid."
 - B. Bidder may include prices for listed alternate manufacturers or add additional manufacturers with corresponding prices, but only the manufacturers listed by the Owner as "Base Bid" will be considered in determining the low bid. Listing of alternate equipment is optional and will not result in submitting a non-responsible bid if none is entered.
 - C. The Owner may select the Base Bid equipment or items of equipment of any alternate manufacturer listed, at Owner's discretion.
 - D. After the Date of Agreement and prior to the selection of the major equipment items, the Contractor, if requested by the Engineer, shall provide information in sufficient detail to allow the Owner and the Engineer to determine whether or not the proposed alternate equipment is equivalent to that specified. The selection of any alternate equipment by the Owner does not relieve the Contractor of his/her responsibility to meet the requirements of the Contract Documents and Specifications.
 - E. Items of equipment selected by the Owner shall be installed at a contract price equal to the Base Bid lump sum adjusted by the add or deduct shown for the items selected by the Owner if

different from the Base Bid items. The Owner will select major equipment items within thirty (30) days after the date of the Notice to Proceed, provided Contractor has provided sufficient information to Owner/Engineer as noted above.

- F. *The Bidder understands that equipment of a proposed alternate manufacturer must meet or exceed the requirements of the Contract Documents and Specifications, be of equal or better quality, and be of equal function to the base bid equipment.*
- G. The price add/deduct for all items of equipment other than base bid items shall include the preparation and submission to the Owner of complete submittals, including detailed drawings showing all modifications, if any, necessary to accommodate such equipment.
- H. The price add/deduct for all items of equipment other than base bid items shall cover a complete operating installation, including any and all buildings, mechanical and electrical work, controls and accessories necessary to accommodate the selected equipment.
- I. The Bidder further understands that the Engineer will review said detailed Drawings or modifications and either approve them or indicate thereon changes necessary to comply with the project requirements in accordance with Article 6.05 of the General Conditions. Detailed drawings which are not approved will be revised and then resubmitted to the Engineer. The deduct and add amounts listed are "installed" prices and take into consideration and include any cost of the design or construction changes that may be required as a result of using the alternate equipment. Unless listed separately, the amount listed shall apply to the additive items also if they are awarded by the Owner.

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.
- 6.03 Bidder agrees to comply with Idaho Code 44-1001 through 44-1005, regarding employment of Idaho residents.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
 - A. Required Bid security in accordance with Article 8 of the Instructions to Bidders;
 - B. Evidence of Authority to Sign;
 - C. Bidder shall include in their Bid the name, or names and address, or addresses, and Idaho Public Works Contractor License Numbers of the Subcontractors who shall, in the event the Bidder secures the Contract, subcontract the plumbing, heating and air-conditioning work, and electrical work under the general Contract;

- D. Bidder's State of Idaho Public Works Contractor's License No. ; 14401-U-1-3-5
- E. Contractor's Non-Collusion Affidavit;
- F. Anti-Discrimination Affidavit;
- G. Required forms from IDEQ Idaho Drinking Water State Revolving Fund (DWSRF) Specifications Insert (Section 4).
1. FORM AIS-1 – Bidder's Certification of Compliance with the Current SRF Assistance American Iron and Steel (AIS) Provisions.

ARTICLE 8 – DEFINED TERMS

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

- 9.01 This Bid is submitted by: TML Construction, Inc.

If Bidder is:

An Individual N/A

Name (typed or printed): _____

By: _____
(Individual's signature)

Doing business as: _____

A Partnership N/A

Partnership Name: _____

By: _____
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): _____

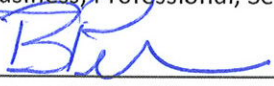
Date of Qualification to do business in Idaho is ____/____/____.

A Corporation

Corporation Name: TML Construction, Inc (SEAL)

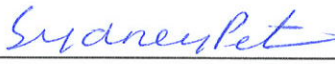
State of Incorporation: Idaho

Type (General Business, Professional, Service, Limited Liability): _____

By: 
(Signature -- attach evidence of authority to sign) see attached

Name (typed or printed): Brian Petersen

Title: President
(CORPORATE SEAL)

Attest 

Date of Qualification to do business in Idaho is 7 / 13 / 99.

A Joint Venture

N/A

Name of Joint Venture: _____

First Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Date of Qualification to do business in Idaho is ____/____/____.

Second Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Date of Qualification to do business in Idaho is ____/____/____.

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address PO Box 2970

Hayden ID 83835

Phone No. 208 762-3611 Fax No. 208 762-9732

E-mail Brian@tmlconst.com

SUBMITTED on 9/13, 2022.

Idaho Public Works Contractor License No. 14401-U-1-3-5

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BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (Name and Address):

TML Construction, Inc.
10186 N. Atlas Road, Hayden, ID 83835

SURETY (Name and Address of Principal Place of Business):

Travelers Casualty and Surety Company of America
One Tower Square, Hartford, CT 06183

OWNER (Name and Address):

City of Moscow
206 East 3rd Street, Moscow, ID 83843

BID

Bid Due Date: September 13, 2022

Description (Project Name and Include Location): Booster Station Replacement - Phase II Rebid
#118-016, Moscow, Idaho

BOND

Bond Number: Bid Bond

Date (Not earlier than Bid due date): September 13, 2022

Penal sum	Five Percent of Amount Bid	\$	5%
	(Written in Words)		(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

TML Construction, Inc. (Seal)

Bidder's Name and Corporate Seal

By:

Signature

Brian Petersen

Print Name

President

Title

Attest:

Signature

Title

SURETY

Travelers Casualty and Surety Company of America (Seal)

Surety's Name and Corporate Seal

By:

Signature (Attach Power of Attorney)

Shelly Donovan

Print Name

Attorney-in-Fact

Title

Attest:

Signature Shawn M. Wilson

Attorney In Fact

Title

Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

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Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company
Farmington Casualty Company

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, St. Paul Fire and Marine Insurance Company, and Farmington Casualty Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint Shelly Donovan of Spokane, WA, their true and lawful Attorney(s)-in-Fact to sign, execute, seal and acknowledge the following bond:

Surety Bond No.: Bid Bond

OR

Principal: TML Construction, Inc.

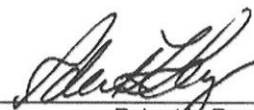
Obligee: City of Moscow

Project Description: Booster Station Replacement - Phase II Rebid, #118-016 Moscow, Idaho

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this **21st** day of **April**, 2021.



State of Connecticut

By: 
 Robert L. Raney, Senior Vice President

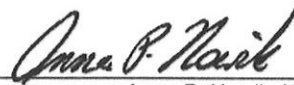
City of Hartford ss.

On this the **21st** day of **April**, 2021, before me personally appeared **Robert L. Raney**, who acknowledged himself to be the Senior Vice President of each of the Companies, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of said Companies by himself as a duly authorized officer.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

My Commission expires the **30th** day of **June**, 2026




 Anna P. Nowik, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of each of the Companies, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

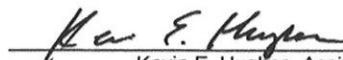
FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of each of the Companies, do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which remains in full force and effect.

Dated this 13th day of September, 2022.




 Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, please call us at 1-800-421-3880.

Please refer to the above-named Attorney(s)-in-Fact and the details of the bond to which this Power of Attorney is attached.

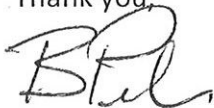
To whom it may concern,

The following persons are corporate officers and board members with authority to sign for all aspects of TML Construction, Inc.

Brian Petersen – President

Sydney Petersen – VP, Secretary/Treasurer

Thank you,



Brian Petersen

President

City of Moscow
Booster Station Replacement – Phase II Rebid

Naming of Subcontractors Form

Per Idaho Code, §67-2310, Bidder shall include in his or her Bid the names and address, and Idaho Public Works Contractor License Number of the Subcontractors who shall, in the event the Bidder secures the Contract, subcontract the plumbing, heating and air-conditioning work, and electrical work under the general Contract. Failure to name Subcontractors as required shall render any Bid submitted by the Bidder unresponsive and void.

<u>Subcontractor Name and Address</u>	<u>Classification</u>	<u>License Number</u>
HILLIARD'S HEATING & PLUMBING Inc PO 414 Pullman WA 99163	Plumbing	12545-A-4
Hilliard's Heating & Plumbing Inc PO 414 Pullman WA 99163	HVAC	12545-A-4
Stroom Electric Inc PO 370 Troy ID 83871	Electrical	022495-AA-4

NOTES TO USER

1. This form must be included for all bids.

Brad Little
Governor

State of Idaho
Division of Occupational and Professional Licenses
PUBLIC WORKS CONTRACTORS LICENSING
CONTRACTOR

PWC-C-14401 - UNLIMITED - 1- 3- 5
License Number

08/12/1999
Original License Issued

This is to certify that
TML CONSTRUCTION, INC.

has fulfilled the requirements of the law relating to licensing in Idaho Code, Title 54, Chapter 19 & 45
and is hereby granted this certificate.

This license expires: 05/31/2023

Sydney Petz
Licensee Signature

Russell S. Barron
Russell Barron, Administrator

City of Moscow
Booster Station Replacement – Phase II Rebid

Contractor's Non-Collusion Affidavit

State of Idaho

) SS

County of Kootenai

Bid for City of Moscow, being first duly sworn, deposes, and says that he is VP [sole owner, a partner, president, secretary, etc.] of, TML Construction, Inc [Bidder],

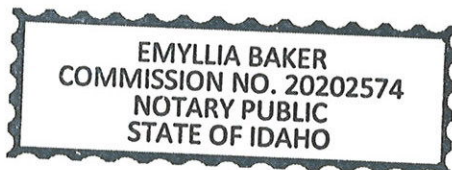
the party making the foregoing Bid; that such Bid is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization or corporation; that such Bid is genuine and not collusive or sham; that said Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham Bid and has not directly or indirectly colluded, conspired, connived or agreed with any Bidder or anyone else to put in a sham Bid, nor that anyone shall refrain from bidding; that said Bidder has not in any manner, directly or indirectly, sought by agreement, communication or conference with anyone to fix the Bid Price of said Bidder or of any other Bidder, nor to fix any overhead, profit or cost element of such Bid Price, nor of that of any other Bidder, nor to secure any advantage against the public body awarding the Contract or anyone interested in the proposed Contract; that all statements contained in such Bid are true; and, further, that said Bidder has not directly or indirectly submitted his Bid Price or any breakdown thereof, nor the contents thereof, nor divulged information or data relative thereto, nor paid and will not pay any fee in connection therewith to any corporation, partnership, company, association, organization, bid depository, nor to any member or agent thereof, nor to any other individual except to such person(s) as has/have a partnership or other financial interest with said Bidder in his general business.

Signed: Sydney Pelt

Title: VP

Subscribed and sworn to before me this 9th
day of September, 2022

(SEAL)



Notary Public Emylin Baker
State of Idaho
My Commission Expires 7/13/2026

City of Moscow
Booster Station Replacement – Phase II Rebid

Anti-Discrimination Affidavit

STATE OF Idaho

COUNTY OF Kootenai

The Bidder hereby covenants, stipulates, and agrees that no person shall be discriminated against in the bidding of the services and/or materials herein under and that the Bidder shall not refuse to hire any person therefore because of such person's race, creed, sex, color, or national origin, unless based on a bona fide occupational qualification. Also, the Bidder will in no manner discriminate against any person because of such person's race, creed, sex, color, or national origin. Any such discrimination shall be deemed a violation of this Bid and shall render this Bid subject to forfeiture.

Suzanne Peters

Contractor's Signature

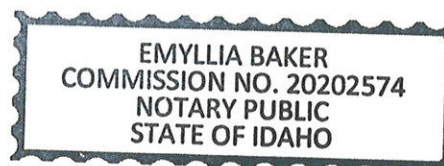
Subscribed and sworn to before me this 9th day of September, 2022

Emyllia Baker
Notary Public

State of Idaho

Residing at 1715 W KATHLEEN AVE CDA ID 83815

My Commission Expires 7/13/2026



To be submitted as part of the sealed bid; Recipient forwards a copy to DEQ

FORM AIS-1
Bidder's Certification of Compliance
With the Current SRF Assistance American Iron and Steel (AIS) Provisions

(To be submitted as part of the sealed bid)

Bidder's Statement of Certification

The Bidder acknowledges to and for the benefit of the ("Owner") for the ("Project") that the Bidder understands the project is being funded in part with SRF Assistance. "AIS" requirements specify that all iron and steel products used in the project shall be produced in the United States. Consistent with the terms of the Owner's bid solicitation and the provisions of SRF Assistance, the Bidder hereby represents and warrants to and for the benefit of the Owner that:

1. The Bidder has reviewed and understands the AIS requirements.
2. The Bidder certifies that the iron and steel goods used in the project will be produced in the United States in a manner that complies with the AIS requirements unless a waiver of the requirements is requested by the Owner and approved by the EPA.
3. The Bidder agrees to provide to the Owner reasonable, sufficient, and timely information, certification, or verification of the United States production of each component contained in Attachment 6 as a prior condition for approval of - and reimbursement for - materials received.
4. The undersigned hereby acknowledges that the iron and steel products utilized in this project will meet the current SRF Assistance AIS requirements, and that all required Manufacturer/Supplier Certification Statements or waivers from EPA will be obtained to document compliance with the AIS requirements.

Bidder Signature:  Date: 9/13/22

Title President

Organization TML Construction, Inc.

<u>Company Name</u>	<u>License Number</u>	<u>Work Category</u>	<u>License Type</u>	<u>License Class</u>	<u>Status</u>	<u>Applicant Name</u>	<u>Owner Name</u>	<u>Company Address</u>	<u>Company City</u>	<u>Company State</u>	<u>Company Zip Code</u>	<u>Phone</u>	<u>Expiration Date</u>	<u>Parent License Number</u>
TML Construction, Inc.	PWC-C-14401	00001, 00003	1, 3, 5	UNLIMITED	ACTIVE	TML Construction, Inc.		PO Box 2970	HAYDEN	ID	83835	(208) 762-3611	5/31/2023	

Client: City of Moscow				ENGINEER'S ESTIMATE (Including contingencies)		TML Construction, Inc. PO Box 2970 Hayden, ID 83835		S & L Underground, Inc. PO Box 1952 Bonners Ferry, ID 83805		IMCO General Construction, Inc. 2116 Buchanan Loop Ferndale, WA 98248	
Project: Booster Station Replacement - Phase II (REBID)											
Bid Opening: September 13, 2022											
Item No.	Item Description	Qty	Unit	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price
Base Bid											
1	Indian Hills Booster Pump Station	1	LS	2,372,100.00	\$ 2,372,100.00	\$ 2,081,000.00	\$ 2,081,000.00	\$ 2,318,400.00	\$ 2,318,400.00	\$ 2,370,376.00	\$ 2,370,376.00
2	Ponderosa Booster Pump Station	1	LS	2,269,800.00	\$ 2,269,800.00	\$ 2,150,000.00	\$ 2,150,000.00	\$ 2,466,700.00	\$ 2,466,700.00	\$ 2,486,022.00	\$ 2,486,022.00
				TOTAL	\$ 4,641,900.00	TOTAL	\$ 4,231,000.00	TOTAL	\$ 4,785,100.00	TOTAL	\$ 4,856,398.00

**CONSTRUCTION AGREEMENT
FOR BOOSTER STATION REPLACEMENT – PHASE II REBID
BETWEEN CITY OF MOSCOW, IDAHO
AND TML CONSTRUCTION, INC.**

THIS CONSTRUCTION AGREEMENT FOR BOOSTER STATION REPLACEMENT – PHASE II REBID BETWEEN CITY OF MOSCOW, IDAHO, AND TML CONSTRUCTION, INC. (hereinafter “Agreement”), dated this ____ day of _____, 2022, by and between City of Moscow, Idaho, a municipal corporation of the State of Idaho, 206 East Third Street, Moscow, Idaho, 83843 (hereinafter "CITY"), and TML Construction, Inc., P.O. Box 2970, Hayden, ID 83835 (hereinafter "CONTRACTOR"):

W I T N E S S E T H:

WHEREAS, pursuant to the invitation of CITY, extended through an “Invitation to Bid” see Attachment ‘A’, CONTRACTOR submitted a Bid Proposal containing an offer invited by said invitation; and

WHEREAS, CITY has determined that said offer was the lowest responsive Bid Proposal; and

WHEREAS, CITY has accepted CONTRACTOR’s Bid Proposal;

NOW THEREFORE, the Parties to this Agreement, in consideration of the mutual covenants and stipulations set out, agree as follows:

**ARTICLE 1.
CONTRACT DOCUMENTS**

The Contract Documents which comprise the entire Agreement between CITY and CONTRACTOR concerning the work to be performed, are this Agreement, pages one (1) through six (6), and the following:

1. Drawings, Specifications and Proposal, Attachment ‘A’ for: Booster Station Replacement – Phase II Rebid, consisting of 1390 pages;
2. Bid Proposal of CONTRACTOR, dated September 13, 2022, see Attachment ‘B’, consisting of 19 pages;
3. Performance and Payment Bonds and Insurance Certificates;
4. Addenda, if applicable, Attachment ‘C’, consisting of 11 pages; and
5. Change Orders, which may be delivered or issued after the effective date of this Agreement.

There are no Contract Documents other than those listed in Article 1. This Agreement may only be amended by change order as provided in the General Conditions of Attachment ‘A’.

ARTICLE 2. WORK

CONTRACTOR shall complete the entire work as specified, indicated and required under the Contract Documents, contained herein under Article 1 for CITY project (hereinafter "Project") titled:

Booster Station Replacement – Phase II Rebid

ARTICLE 3. CONTRACT TIME/SUBSTANTIAL COMPLETION

The work to be performed pursuant to this Agreement shall be substantially completed within two hundred and seventy (270) calendar days of the notice to proceed, unless adjustment of the Agreement time is made in accordance with the provisions of the Contract Documents. Final Completion of all work shall be accomplished within thirty (30) calendar days after receiving Substantial Completion. CONTRACTOR shall begin work in conformance with the Contract Documents.

CONTRACTOR and CITY recognize that time is of the essence and that CITY will suffer financial loss if the Project is not completed within the time specified above, unless approved extensions thereof are permitted in accordance with Article 12 of the General Conditions. The Parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by CITY if the Project is not completed on time. Accordingly, instead of requiring any such proof, CITY and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay CITY Three Thousand Dollars (\$3,000) for each day that expires after the time specified above for Substantial Completion until the Project is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining Project within the Time of Completion or by any proper extension thereof granted by CITY, CONTRACTOR shall pay CITY Three Thousand Dollars (\$3,000) for each day that expires after the time specified above for completion, until the Project is completed and ready for final payment.

ARTICLE 4. CONTRACT SUM

CITY shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents in current funds in the amount of Four Million Two Hundred Thirty-One Thousand Dollars (\$4,231,000.00), as submitted by CONTRACTOR. In no event shall Contract amount exceed CONTRACTOR's bid amount of Four Million Two Hundred Thirty-One Thousand Dollars (\$4,231,000.00), unless otherwise authorized by CITY by written agreement. Said Contract Sum shall be paid in accordance with the Contract Documents.

ARTICLE 5. INDEPENDENT CONTRACTOR

The Parties warrant by their signatures that no employer-employee relationship is established between CONTRACTOR and CITY by the terms of this Agreement. It is understood by the Parties

hereto that CONTRACTOR is an independent contractor and, as such, neither CONTRACTOR nor CONTRACTOR's employees, agents, representatives or subcontractors, if any, are employees of CITY for purposes of tax, retirement system, or social security (FICA) withholding.

ARTICLE 6. SCOPE OF SERVICES

CONTRACTOR shall perform all work required by the Contract Documents. All work shall be completed in accordance with the specifications and plans established for this Project.

ARTICLE 7. HOLD HARMLESS/INDEMNIFICATION

In addition to other rights granted CITY by the Contract Documents, CONTRACTOR agrees to indemnify, defend, and hold harmless CITY, its officers, agents, employees, and engineers, from and against any and all losses, lawsuits, actions, claims, judgments for damages, or any injuries or damages received or sustained by any person, persons, or property, and losses, expenses, and other costs, including litigation costs and attorney's fees, arising out of, resulting from, or in connection with the acts and/or any performances, activities, errors or omissions by CONTRACTOR, CONTRACTOR's servants, agents, officers, employees, representatives, guests, business invitees or its subcontractors; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any claims or amounts recovered from any infringements of patent, trademark or copyright; or from any claims or amounts arising out of or recovered under the Workmen's Compensation Act or any other law, ordinance, order, or decree.

ARTICLE 8. CONFLICT OF INTEREST

CONTRACTOR covenants that it presently has no interest and will not acquire any interest, direct or indirect, in the Project, which would conflict in any manner or degree with the performance of CONTRACTOR's services hereunder. CONTRACTOR further covenants that, in performing this Agreement, CONTRACTOR will employ no person who has any such interest. Should any conflict of interest arise during the performance of this Agreement, CONTRACTOR shall immediately disclose such conflict to the CITY.

ARTICLE 9. ENTIRE AGREEMENT, MODIFICATION AND ASSIGNABILITY

This Agreement and the exhibits hereto contain the entire Agreement between the Parties, and no statements, promises, or inducements made by either Party, or agents of either Party are valid or binding unless contained herein. This Agreement may not be enlarged, modified or altered except upon written agreement signed by the Parties hereto. CONTRACTOR may not subcontract or assign its rights (including the right to compensation) or duties arising hereunder, other than as provided within the Contract Documents, without the prior written consent and express authorization of CITY.

ARTICLE 10.
LICENSES AND ADHERENCE TO LAW REQUIRED

CONTRACTOR represents that he possesses the skill and experience necessary and all licenses required to perform the services under this Agreement. CONTRACTOR further agrees to comply with all applicable Federal, State and Local statutes and regulations in the performance of the services hereunder, and are hereby made a part of this Agreement and shall be adhered to at all times. Violation of any of these statutes or regulations by CONTRACTOR shall be deemed material and shall subject CONTRACTOR to termination of this Agreement for cause. No pleas of misunderstanding or ignorance on the part of CONTRACTOR will, in any way, serve to modify the provisions of this requirement. CONTRACTOR and its surety shall indemnify, defend and hold harmless CITY and its employees, agents, engineers and representatives against any claim or liability arising from or based on the violation of any such laws, codes, ordinances, or regulations, whether by CONTRACTOR, CONTRACTOR's employees, or its subcontractors.

Anti-Boycott Against Israel Act. CONTRACTOR certifies it is not currently engaged in, and will not for the duration of the Agreement engage in, a boycott of goods and services from Israel or territories under its control. Failure to comply with I.C. 67-2346 will result in this Agreement being void as against public policy.

ARTICLE 11.
EMPLOYMENT DISCRIMINATION

It is illegal under the U.S. Federal law to discriminate against an employee, either intentionally or through disparate impact, on account of race, color, gender, religion, sex (including pregnancy), national origin, physical or mental disability, age, marital or familial status, sexual orientation, and gender expression or identity. CONTRACTOR shall not discriminate against any employee or applicant for employment. CONTRACTOR's action under this Section shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training, including apprenticeship. CONTRACTOR agrees to post in conspicuous places, available to employees and other applicants for employment, notices setting forth the provisions of this non-discrimination Section.

ARTICLE 12.
LEGAL FEES

In the event either Party incurs legal expenses to enforce the terms and conditions of this Agreement, the prevailing Party is entitled to recover attorney's fees and other costs and expenses, whether the same are incurred with or without a lawsuit.

ARTICLE 13.
JURISDICTION, VENUE AND NONWAIVER

It is agreed that this Agreement shall be construed under and governed by the laws of the State of Idaho. In the event of litigation concerning it, it is agreed that proper venue shall be the District Court of the Second Judicial District of the State of Idaho, in and for the County of Latah. Failure

of CITY to exercise any of the rights under this Agreement, or breach thereof, shall not be deemed to be a waiver of such right or a waiver of any subsequent breach.

ARTICLE 14. SPECIAL WARRANTY

CONTRACTOR warrants that nothing of monetary value has been given, promised or implied as remuneration or inducement to enter into this Agreement. CONTRACTOR declares that no improper personal, political or social activities have been used or attempted in an effort to influence the outcome of the competition, discussion, or negotiation leading to the award of this Agreement. Any such activity by CONTRACTOR shall make this Agreement null and void. CONTRACTOR further warrants that all materials and goods supplied under this Agreement shall be of good merchantable quality and that all services will be performed in a good workmanlike manner. CONTRACTOR acknowledges that it will be liable for any breach of this warranty.

ARTICLE 15. COMMUNICATIONS

Such communications as are required by this Agreement shall be satisfied by mailing or by personal delivery to the Parties at the following address:

CONTRACTOR:

TML Construction, Inc
Brian K Petersen
P.O. Box 2970
Hayden, ID 83835

CITY:

City of Moscow
Engineering Division
206 East Third Street
P O Box 9203
Moscow, Idaho 83843

ARTICLE 16. NON-APPROPRIATIONS

This Agreement is contingent upon CITY receiving the necessary funding to cover the obligations of CITY. In the event that such funding is not received or appropriated, then, and in that event, CITY's obligations under this Agreement shall cease and each Party shall be released from further performance under this Agreement without any liability to the other Party, and CONTRACTOR shall be entitled to receive just and equitable compensation for any work satisfactorily completed hereunder.

ARTICLE 17. APPROVAL REQUIRED AND SEVERABILITY

This Agreement shall not become effective or binding until approved by CITY. If any part of this Agreement is held unenforceable, the remaining portions of the Agreement will, nevertheless, remain in full force and effect.

ARTICLE 18. EXECUTION

IN WITNESS WHEREOF, said CONTRACTOR and CITY have caused this Agreement to be executed on the day and year first above written.

I Brian K. Petersen, certify under penalty of perjury pursuant to the law of the State of Idaho, that I am an authorized agent to bind TML Construction, Inc. to this Agreement.

CONTRACTOR:

TML Construction, Inc.

CITY:

City of Moscow, Idaho

By: Brian K. Petersen, President

Arthur D. Bettge, Mayor

ATTEST:

Laurie M. Hopkins, City Clerk

Approved as to Form:

Mia Bautista, City Attorney

ACKNOWLEDGMENT

STATE OF _____)
) ss.
COUNTY OF _____)

On this _____ day of _____, 2022, before me, a Notary Public in and for said State, appeared Brian K. Petersen, known to me to be the person named above and acknowledged that he/she executed the foregoing document as the duly authorized representative for TML Construction, Inc.

Notary Public for the State of _____
Residing at _____
My commission expires _____

Attachment A

City of Moscow

Latah County, Idaho



Booster Station Replacement – Phase II Rebid

REBID SET

AUGUST 2022

VOLUME I OF III

BID AND CONTRACT DOCUMENTS

ENGINEER:



J-U-B ENGINEERS, Inc

201 S. Jackson St.
Moscow, Idaho 83843
(208) 746-9010
www.jub.com

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VOLUME I OF III

BID AND CONTRACT DOCUMENTS

City of Moscow

Latah County, Idaho

Booster Station Replacement – Phase II Rebid

Rebid Set

AUGUST 2022

NOTICE AND DISCLAIMER

THE PLANS AND/OR SPECIFICATIONS (DOCUMENTS) ARE THE PROPERTY OF J-U-B ENGINEERS, INC. ("J-U-B") AND BY USING THE DOCUMENTS YOU AGREE TO BE BOUND BY THE TERMS AND CONDITIONS IN THIS NOTICE AND DISCLAIMER.

THE USE OF THE DOCUMENTS CREATES NO DUTY IN CONTRACT, TORT, EQUITY OR OTHERWISE OF J-U-B TO THE USER. THE USER SHALL NOT (I) DISSEMINATE THE DOCUMENTS, OR ANY PART THEREOF, TO OTHERS WITHOUT THE WRITTEN CONSENT OF J-U-B, OR (II) USE THE DOCUMENTS, OR ANY PART THEREOF, FOR ANY USE OTHER THAN AS DESIGNATED HEREIN FOR THE INTENDED PROJECT. THE DOCUMENTS ARE NOT INTENDED FOR USE IN CREATING DTM FOR GRADING OR EARTHWORK, SURVEY STAKING LAYOUT (UN-LESS SPECIFICALLY IDENTIFIED AS SUCH IN THE DOCUMENTS), OR PROPERTY BOUNDARY LAYOUTS.

J-U-B AND ITS AGENTS SHALL NOT BE LIABLE FOR ANY DAMAGES OR CLAIMS ARISING OUT OF THE UNAUTHORIZED USE OR MISUSE OF THE DOCUMENTS, OR ANY PART THEREOF, WHETHER SUCH DAMAGE OR CLAIM IS BASED IN CONTRACT, TORT OR OTHERWISE. THE USER HEREBY RELEASES AND SHALL DEFEND, INDEMNIFY AND HOLD J-U-B AND ITS AGENTS HARMLESS FROM ANY DAMAGES OR CLAIMS ARISING OUT OF, OR RELATED IN ANY WAY TO, THE USER'S UNAUTHORIZED USE OR MISUSE OF THE DOCUMENTS, OR ANY PART THEREOF.

IF THE DOCUMENTS ARE PROVIDED IN ELECTRONIC FORMAT, THE ELECTRONIC DOCUMENTS ARE SUBJECT TO THE PROVISIONS OF J-U-B'S "ELECTRONIC DOCUMENT/DATA LIMITED LICENSE" FOUND AT EDOCS.

Engineer:



J-U-B ENGINEERS, Inc
201 S. Jackson St.
Moscow, Idaho 83843
(208) 746-9010



Owner:



City of Moscow
206 East Third Street
Moscow, Idaho 83843
(208) 883-7080

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**City of Moscow
Booster Station Replacement – Phase II Rebid**

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BIDDING AND AGREEMENT FORMS

SECTION 1-A – BID FORMS (white)

Document 00030 – Invitation to Bid
Document 00040 – Bidder’s Checklist
Document 00200 – Instructions to Bidders
Document 00410 – Bid Form
Document 00415 – Contractor’s Non-Collusion Affidavit
Document 00420 – Anti-Discrimination Affidavit
Document 00430 – Bid Bond – Penal Sum Form
Document 00440 – Naming of Subcontractors Form

SECTION 1-B – CONTRACT FORMS (white)

Document 00510 – Notice of Award
Document 00520 – Construction Agreement
Document 00550 – Notice to Proceed
Document 00610 – Performance Bond
Document 00615 – Payment Bond
WH-5 Public Works Contract Report
Document 00620 – Contractor’s Application for Payment
Document 00625 – Certificate of Substantial Completion
Document 00940 – Work Change Directive
Document 00941 – Change Order
Document 00942 – Field Order

SECTION 2 – GENERAL CONDITIONS (green)

ISPWC Division 100 – Standard General Conditions to the Construction Contract

SECTION 3 – SUPPLEMENTARY CONDITIONS (blue)

**SECTION 4 – FORM 6A - IDEQ IDAHO DRINKING WATER STATE REVOLVING FUND (DWSRF)
SPECIFICATIONS INSERT** (golden yellow)

**SECTION 5 / 6 – PREVAILING WAGE (DAVIS BACON) DETERMINATION & CITY OF MOSCOW
FEDERALLY FUNDED PROJECTS DAVIS BACON LABOR STANDARDS** (pink)

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Section 1-A

Bid Forms

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City of Moscow
Booster Station Replacement – Phase II Rebid

Invitation to Bid

The City of Moscow, Idaho is accepting sealed bids to be submitted to the business office of the Community Development Engineering Division at 504 S. Washington Street, Moscow, Idaho 83843 and clearly marked “**Bid Enclosed – Booster Station Replacement – Phase II Rebid**”, until 2:00 pm prevailing local time, Tuesday September 13, 2022, for the following project:

BOOSTER STATION REPLACEMENT – PHASE II REBID

At **2:15 p.m., on the same day**, all proposals will be publicly opened and read aloud at the same location.

Moscow Booster Station Replacement – Phase II Rebid generally consists construction of two (2) new booster pump stations, Indian Hills and Ponderosa, including site work, piping, pumps and all appurtenances, electrical and controls. It is the intent of these documents to describe the work required to complete this project in sufficient detail to secure comparable bids. All parts or work not specifically mentioned that are necessary in order to provide a complete installation shall be included in the bid and shall conform to all local, State, and Federal requirements.

Complete digital Project Manual and Project Plans, may be viewed at www.questcdn.com via the link provided on The City of Moscow Website at: www.ci.moscow.id.us – click on “Business” / “Open Bid Opportunities” / “Booster Station Replacement – Phase II Rebid”

Once on the Quest site, you may download the digital plan documents for a **non-refundable fee of \$20.00**. The Quest project number is **8276908**. Please contact QuestCDN.com at 952-233-1632 or info@questcdn.com for assistance in free membership registration, downloading, and working with digital project information

The Contract Documents may also be examined at the following locations:

- City of Moscow, Community Development Engineering Division, 504 S. Washington Street, Moscow, ID 83843
- J-U-B ENGINEERS, Inc.; 201 S Jackson St., Moscow ID 83843

A **Pre-Bid Conference** will be held at **2:00 p.m.**, prevailing local time, **Thursday September 1, 2022**, at the Moscow City Hall Council Chambers, 206 East Third Street, Moscow, Idaho. The meeting will also be broadcasted live via ZOOM platform. All prospective bidders are welcome to attend in person or via Zoom hosted by ENGINEER using the following login information:

- Meeting Web Address: <https://jubengineers.zoom.us/j/89430482290>
- Meeting Phone Number: 1-253-215-8782
- Meeting ID#: 894 3048 2290

This project is subject to Prevailing Wages and American Iron and Steel (AIS) requirements.

The Contractor shall not discriminate on the basis of race, color, national origin, religion, creed, sex, or age in the performance of this contract. Failure by the Contractor to carry out these requirements is a

material breach of this contract which may result in the termination of this contract or other legally available remedies.

Bids must be accompanied by Bid Security in the form of a bid bond, certified check, or cashier's check in the amount of 5% of the amount of the bid proposal. Said bid security shall be forfeited to the City of Moscow, Idaho as liquidated damages should the successful bidder fail to enter into contract in accordance with their proposal as specified in the Instructions to Bidders. An Idaho Public Works License is required to bid.

Any objections to the contents or terms of the documents shall be raised seven (7) days prior to bid opening or it shall be deemed to have been waived.

The City reserves the right to reject any or all Bid Proposals, to waive any formality in the Bidding Contract Documents, and to make selection to the lowest responsive, responsible, and qualified Bidder as it may best serve the interest of the City.

Questions shall be referred to the Project Engineer, Braxton Klas, at J-U-B ENGINEERS, Inc. at 201 S. Jackson St. Moscow, ID 83843; phone 208-746-9010; email bklas@jub.com, cc: jwaller@jub.com.

Publish Dates: August 13, 2022 and August 20, 2022

Jennifer Fleischman
email: jfleischman@ci.moscow.id.us
phone: 208.883.7035

City of Moscow
Booster Station Replacement – Phase II Rebid

Bidder's Checklist

The Bidder's Check List is offered to assist the prospective bidder in checking his/her Bid. This checklist does not relieve the bidder from properly completing his/her Bid.

Check off when completed:

1. _____ Are all blank spaces filled out on Bid Form?
2. _____ Have questions arising from the bidding, contract, specifications or plans been submitted to the proper authority and resolved in the proper manner?
3. _____ Are Bid amounts shown correctly as well as extensions and totals? Recheck for errors or omissions.
4. _____ Are authorized signatures properly affixed to the Bid form, giving also title, and Idaho Public Works Contractor license number, evidence of authority to sign, etc.?
5. _____ Have all plumbing, heating, air conditioning and electrical subcontractors to whom work will be awarded been listed, as well as their Idaho Public Works Contractor license number?
6. _____ Have all Addenda been received and acknowledged with the proper signature on the Bid Form?13.
7. _____ In order for a Bid to be considered, the required attachments must be placed in a properly addressed sealed envelope and delivered to the specified authority prior to the time designated for the bid opening.
8. _____ Has the Bid Security been enclosed?
9. _____ Has Bidder performed examinations in accordance with the Instructions to Bidders?
10. _____ Has Bidder included additional information required in Article 15 of the Instructions to Bidders?
11. _____ Bidder has carefully studied site conditions, tests, investigations, and technical data which may affect the cost, progress, or performance of the Work.
12. _____ Has Bidder attended the pre-bid conference?
13. _____ Has Bidder included Anti-Discrimination Affidavit?
14. _____ Has Bidder included appropriate forms from Section 4 (IDEQ Idaho DWSRF Specifications Insert)? The following forms are required to be submitted with the Bid
 - a. FORM AIS-1 – Bidder's Certification of Compliance with the Current SRF Assistance American Iron and Steel (AIS) Provisions.

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**City of Moscow
Booster Station Replacement – Phase II Rebid**

Instructions to Bidders

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ARTICLE 1 – DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

- A. *Bidder* – One who submits a Bid directly to the Owner, as distinct from a Sub-Bidder, who submits a Bid to a Bidder.
- B. *Issuing Office* – The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered. The Issuing Office for this project is:

J-U-B ENGINEERS, Inc.
201 S. Jackson St.
Moscow, ID 83843
(208) 746-9010

Electronic copies of the Contract Documents shall be obtained from www.questcdn.com, Quest project # 8276908.

- C. *Owner* – The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed. The Owner for this project is:

City of Moscow
206 East 3rd Street
Moscow, Idaho 83843

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Invitation to Bid may be obtained from the Issuing Office. The deposit for the Bidding Documents is **not** refundable.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license or grant for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, within five days of Owner's request, Bidder shall submit written evidence as may be called for below.
 - A. See 13.11.

B. See 3.03

3.02 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

3.03 Idaho Code 54-1902 requires Bidder and subcontractors to have the appropriate Public Works Contractor's License to submit a Bid or proposal for this project. Public Works Contractor License Number shall be submitted with the Bid where indicated on the Bid Form.

ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

4.01 *Subsurface and Physical Conditions*

A. The Supplementary Conditions identify:

1. Those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site.
2. Those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. Copies of reports and drawings referenced in Paragraph 4.01.A will be made available by Owner to any Bidder on request at the cost of reproduction. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions has been identified and established in Paragraph 4.02 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.02 *Underground Facilities*

A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

4.03 *Hazardous Environmental Condition*

A. The Supplementary Conditions identify any reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.

B. Copies of reports and drawings referenced in Paragraph 4.03.A will be made available by Owner to any Bidder on request at the cost of reproduction. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.06 of the General Conditions has been identified and established in Paragraph 4.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible

changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 4.06 of the General Conditions.

- 4.05 On request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.
- 4.06 If applicable, reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, Owner will provide to each Bidder for examination access to or copies of contract documents (other than portions thereof related to price) for such other work.

Paragraph 6.13.C of the General Conditions indicates that if an Owner safety program exists, it will be noted in the Supplementary Conditions.

- 4.07 It is the responsibility of each Bidder before submitting a Bid to:
- A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;
 - B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
 - C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;
 - D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Paragraph 4.02 of the Supplementary Conditions as containing reliable "technical data;
 - E. consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;

- F. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and
- I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 – PRE-BID CONFERENCE

5.01 A pre-Bid conference will be held at the time and location indicated in the Invitation to Bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 6 – SITE AND OTHER AREAS

6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than ten days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

7.03 Where discrepancies occur in the Contract Documents, the most stringent requirement will dictate.

ARTICLE 8 – BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5% percent of Bidder's maximum Bid price and in the form of cash, a certified check, cashier's check, ~~bank money order~~, or a Bid bond (on the form attached) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.

8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited in accordance with State law. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

8.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within fourteen days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS AND OTHERS

12.01 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

- 12.02 Per Idaho Code 67-2310, Bidder shall include in his Bid the name, or names and address, or addresses, and Idaho Public Works Contractor License numbers of the Subcontractors who shall, in the event the Bidder secures the Contract, subcontract the plumbing, heating and air-conditioning work, and electrical work under the general Contract. Failure to name Subcontractors as required by this section shall render any Bid submitted by the Bidder unresponsive and void. Use naming of subcontractors form 00440.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from Engineer.
- 13.02 All blanks on the Bid Form shall be completed in ink and the Bid Form signed. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each item listed therein or the words “No Bid,” “No Change,” or “Not Applicable” entered.
- 13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.
- 13.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown.
- 13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 13.06 A Bid by an individual shall show the Bidder’s name and official address.
- 13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown. Include evidence of authority to sign.
- 13.08 All names shall be printed or typed in ink below the signatures.
- 13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.10 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.11 The Bid shall contain evidence of Bidder’s authority and qualification to do business in Idaho. If the project is federally funded, signing the Bid Form constitutes a covenant to obtain such qualification prior to award of the Contract. Bidder’s Idaho Public Works Contractor License Number shall also be shown on the Bid form.

ARTICLE 14 – BASIS OF BID; COMPARISON OF BIDS

14.01 Lump Sum

- A. Bidders shall submit a Bid on a lump sum basis for the Base Bid and include a separate price for each alternate described in the Bidding Documents as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

14.02 Allowances

- A. Not used.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished the Bid Bond Form. The Bid Form is to be completed and submitted with all the attachments outlined in Article 7 of the Bid Form.
- 15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." When using the mail or other delivery system, the Bidder is totally responsible for the mail or other delivery system delivering the Bid at the place and prior to the time indicated in the Invitation to Bid. A mailed Bid shall be addressed to *Owner at address in Article 1.01 of Bid Form*.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.
- ~~16.02 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.~~
- 16.03 Relief from Bids. (a) If the Owner determines that a Bidder is entitled to relief from a Bid because of mistake, the Owner shall prepare a report in writing to document the facts establishing the existence of each element required in Section 54-1904C, Idaho Code. The Owner shall make the report available for inspection as a public record. (b) A Bidder claiming a mistake satisfying all the conditions of Section 54-1904C, Idaho Code, shall be entitled to relief from the Bid and have any Bid Security returned by the public entity. Bidders not satisfying the conditions found in Section 54-1904C, Idaho Code, shall forfeit

any Bid Security. Bidders failing to execute a Contract and not satisfying the conditions of a mistake shall also forfeit any Bid Security.

16.04 Grounds for Relief. The Bidder shall establish to the satisfaction of the public entity that:

a) A clerical or mathematical mistake was made;

b) The Bidder gave the public entity written notice within five (5) calendar days after the opening of the bids of the mistake, specifying in the notice in detail how the mistake occurred; and

c) The mistake was material.

ARTICLE 17 – OPENING OF BIDS

17.01 Bids will be opened at the time and place indicated in the Invitation to Bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids and to award the bid in conformance with Title 67, Chapter 28 of the Idaho Code. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

19.03 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates (if any), unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

19.04 If the Contract is to be awarded, the Owner will award the Contract to the lowest responsive and responsible Bidder whose Bid is acceptable to the Owner. The basis of award will be based on the lowest Base Bid.

19.05 In order for a Bid to be considered responsive, the Bid Form must be completed, including the Base Bid and all listed Additive Alternates.

ARTICLE 20 – CONTRACT SECURITY AND INSURANCE

- 20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds.

ARTICLE 21 – SIGNING OF AGREEMENT

- 21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

ARTICLE 22 – SALES AND USE TAXES

- ~~22.01 Owner is exempt from _____ state sales and use taxes on materials and equipment to be incorporated in the Work. (Exemption No. _____). Said taxes shall not be included in the Bid. Refer to Paragraph 6.10 of the Supplementary Conditions for additional information.~~

- 22.01 Refer to Article 6 of the General Conditions for tax requirements.

ARTICLE 23 – RETAINAGE

- ~~23.01 Provisions for retainage are as established in Article 6 of the Agreement Supplementary Conditions. Provisions concerning Contractor's rights to deposit securities in lieu of retainage are set forth in the Agreement.~~

ARTICLE 24 – PREVAILING WAGE RATES

- 24.01 The successful Bidder is required to pay Prevailing Wage Rates on this project.
- 24.02 The governing Wage Decision is included in Section 5 of the project specifications.

ARTICLE 25 – AMERICAN IRON AND STEEL (AIS) PROVISIONS

- 25.01 The successful Bidder is required to comply with American Iron and Steel (AIS) provisions per Section 4 of the project specifications.

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**City of Moscow
Booster Station Replacement – Phase II Rebid**

Bid Form

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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

City of Moscow Attn: City Clerk
504 S. Washington Street
Moscow, Idaho 83843

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged:

Addendum No.

Addendum Date

_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in SC-4.02 as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in SC-4.06 as containing reliable "technical data."

E. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and

procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.

- F. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, test, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder safety precautions and programs incident thereto.
- G. Based on the information and observations referred to in Paragraph 3.01.E above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- H. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- I. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and is not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

BASE BID – BOOSTER STATION REPLACEMENT– PHASE II REBID

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
1	Indian Hills Booster Pump Station	1	LS	\$	\$
2	Ponderosa Booster Pump Station	1	LS	\$	\$
BASE BID TOTAL					\$

BASE BID TOTAL PRICE _____
(use words)

5.02 Major Equipment Items: Certain items of major equipment to be provided under this Contract are tabulated in the Schedule of Manufacturers and Suppliers of Major Equipment and Material Items. In connection with the tabulation of major items of equipment included in the lump sum base bid, the following shall apply:

- A. The lump sum bid shall include the installed prices from those manufacturers listed by the Owner as "Base Bid."
- B. Bidder may include prices for listed alternate manufacturers or add additional manufacturers with corresponding prices, but only the manufacturers listed by the Owner as "Base Bid" will be considered in determining the low bid. Listing of alternate equipment is optional and will not result in submitting a non-responsible bid if none is entered.
- C. The Owner may select the Base Bid equipment or items of equipment of any alternate manufacturer listed, at Owner's discretion.
- D. After the Date of Agreement and prior to the selection of the major equipment items, the Contractor, if requested by the Engineer, shall provide information in sufficient detail to allow the Owner and the Engineer to determine whether or not the proposed alternate equipment is equivalent to that specified. The selection of any alternate equipment by the Owner does not relieve the Contractor of his/her responsibility to meet the requirements of the Contract Documents and Specifications.
- E. Items of equipment selected by the Owner shall be installed at a contract price equal to the Base Bid lump sum adjusted by the add or deduct shown for the items selected by the Owner if

different from the Base Bid items. The Owner will select major equipment items within thirty (30) days after the date of the Notice to Proceed, provided Contractor has provided sufficient information to Owner/Engineer as noted above.

- F. *The Bidder understands that equipment of a proposed alternate manufacturer must meet or exceed the requirements of the Contract Documents and Specifications, be of equal or better quality, and be of equal function to the base bid equipment.*
- G. The price add/deduct for all items of equipment other than base bid items shall include the preparation and submission to the Owner of complete submittals, including detailed drawings showing all modifications, if any, necessary to accommodate such equipment.
- H. The price add/deduct for all items of equipment other than base bid items shall cover a complete operating installation, including any and all buildings, mechanical and electrical work, controls and accessories necessary to accommodate the selected equipment.
- I. The Bidder further understands that the Engineer will review said detailed Drawings or modifications and either approve them or indicate thereon changes necessary to comply with the project requirements in accordance with Article 6.05 of the General Conditions. Detailed drawings which are not approved will be revised and then resubmitted to the Engineer. The deduct and add amounts listed are "installed" prices and take into consideration and include any cost of the design or construction changes that may be required as a result of using the alternate equipment. Unless listed separately, the amount listed shall apply to the additive items also if they are awarded by the Owner.

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.
- 6.03 Bidder agrees to comply with Idaho Code 44-1001 through 44-1005, regarding employment of Idaho residents.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
 - A. Required Bid security in accordance with Article 8 of the Instructions to Bidders;
 - B. Evidence of Authority to Sign;
 - C. Bidder shall include in their Bid the name, or names and address, or addresses, and Idaho Public Works Contractor License Numbers of the Subcontractors who shall, in the event the Bidder secures the Contract, subcontract the plumbing, heating and air-conditioning work, and electrical work under the general Contract;

- D. Bidder's State of Idaho Public Works Contractor's License No. ;
- E. Contractor's Non-Collusion Affidavit;
- F. Anti-Discrimination Affidavit;
- G. Required forms from IDEQ Idaho Drinking Water State Revolving Fund (DWSRF) Specifications Insert (Section 4).
 - 1. FORM AIS-1 – Bidder's Certification of Compliance with the Current SRF Assistance American Iron and Steel (AIS) Provisions.

ARTICLE 8 – DEFINED TERMS

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

- 9.01 This Bid is submitted by:

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____
(Individual's signature)

Doing business as: _____

A Partnership

Partnership Name: _____

By: _____
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Date of Qualification to do business in Idaho is ____/____/____.

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

Type (General Business, Professional, Service, Limited Liability): _____

By: _____
(Signature -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____
(CORPORATE SEAL)

Attest _____

Date of Qualification to do business in Idaho is ____/____/____.

A Joint Venture

Name of Joint Venture: _____

First Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Date of Qualification to do business in Idaho is ____/____/____.

Second Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Date of Qualification to do business in Idaho is ____/____/____.

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address _____

Phone No. _____ Fax No. _____

E-mail _____

SUBMITTED on _____, 20____.

Idaho Public Works Contractor License No. _____.

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**City of Moscow
Booster Station Replacement – Phase II Rebid**

Contractor's Non-Collusion Affidavit

State of _____

) SS

County of _____

Bid for _____, being first duly sworn, deposes, and says that he is _____ [sole owner, a partner, president, secretary, etc.] of, _____ [Bidder],

the party making the foregoing Bid; that such Bid is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization or corporation; that such Bid is genuine and not collusive or sham; that said Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham Bid and has not directly or indirectly colluded, conspired, connived or agreed with any Bidder or anyone else to put in a sham Bid, nor that anyone shall refrain from bidding; that said Bidder has not in any manner, directly or indirectly, sought by agreement, communication or conference with anyone to fix the Bid Price of said Bidder or of any other Bidder, nor to fix any overhead, profit or cost element of such Bid Price, nor of that of any other Bidder, nor to secure any advantage against the public body awarding the Contract or anyone interested in the proposed Contract; that all statements contained in such Bid are true; and, further, that said Bidder has not directly or indirectly submitted his Bid Price or any breakdown thereof, nor the contents thereof, nor divulged information or data relative thereto, nor paid and will not pay any fee in connection therewith to any corporation, partnership, company, association, organization, bid depository, nor to any member or agent thereof, nor to any other individual except to such person(s) as has/have a partnership or other financial interest with said Bidder in his general business.

Signed: _____

Title: _____

Subscribed and sworn to before me this _____ day of _____, 20__.

(SEAL)

Notary Public _____

State of _____

My Commission Expires _____

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**City of Moscow
Booster Station Replacement – Phase II Rebid**

Anti-Discrimination Affidavit

STATE OF _____;

COUNTY OF _____;

The Bidder hereby covenants, stipulates, and agrees that no person shall be discriminated against in the bidding of the services and/or materials herein under and that the Bidder shall not refuse to hire any person therefore because of such person's race, creed, sex, color, or national origin, unless based on a bona fide occupational qualification. Also, the Bidder will in no manner discriminate against any person because of such person's race, creed, sex, color, or national origin. Any such discrimination shall be deemed a violation of this Bid and shall render this Bid subject to forfeiture.

Contractor's Signature

Subscribed and sworn to before me this _____ day of _____, 20__.

Notary Public

State of _____

Residing at _____

My Commission Expires _____

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BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (*Name and Address*):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

BID

Bid Due Date:

Description (*Project Name and Include Location*):

BOND

Bond Number:

Date (Not earlier than Bid due date):

Penal sum

(Written in Words)

\$

(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

SURETY

(Seal)

(Seal)

Bidder's Name and Corporate Seal

Surety's Name and Corporate Seal

By:

Signature

By:

Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest:

Signature

Attest:

Signature

Title

Title

Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

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**City of Moscow
Booster Station Replacement – Phase II Rebid**

Naming of Subcontractors Form

Per Idaho Code, §67-2310, Bidder shall include in his or her Bid the names and address, and Idaho Public Works Contractor License Number of the Subcontractors who shall, in the event the Bidder secures the Contract, subcontract the plumbing, heating and air-conditioning work, and electrical work under the general Contract. Failure to name Subcontractors as required shall render any Bid submitted by the Bidder unresponsive and void.

<u>Subcontractor Name and Address</u>	<u>Classification</u>	<u>License Number</u>
_____	Plumbing	_____

_____	HVAC	_____

_____	Electrical	_____

NOTES TO USER

- 1. This form must be included for all bids.*

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Section 1-B

Contract Forms

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Notice of Award

Date: _____

Project: Booster Station Replacement - Phase II Rebid

Owner: City of Moscow, Idaho

Owner's Contract No.: 118-016

Contract: Booster Station Replacement – Phase II Rebid

Engineer's Project No.: 21-18-022

Bidder: _____

Bidder's Address: *[send Notice of Award Certified Mail, Return Receipt Requested]*

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for _____

[Indicate total Work, alternates, or sections of Work awarded.]

The Contract Price of your Contract is _____ Dollars (\$_____).

[Insert appropriate data if unit prices are used. Change language for cost-plus contracts.]

_____ copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

_____ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within [15] days of the date you receive this Notice of Award.

1. Deliver to the Owner [_____] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 20) and General Conditions (Paragraph 5.01).
3. Other conditions precedent:

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

City of Moscow, Idaho

Owner

By: _____

Authorized Signature

Title

Copy to Engineer

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**CONSTRUCTION AGREEMENT
BOOSTER STATION REPLACEMENT – PHASE II REBID
BETWEEN CITY OF MOSCOW, IDAHO
AND _____**

THIS CONSTRUCTION AGREEMENT FOR BOOSTER STATION REPLACEMENT _ PHASE II REBID BETWEEN CITY OF MOSCOW, IDAHO AND _____. (hereinafter "Agreement"), dated this ____ day of _____, 2021, by and between the City of Moscow, Idaho, a municipal corporation of the State of Idaho, 206 East Third Street, Moscow, Idaho, 83843 (hereinafter "CITY"), and _____ (hereinafter "CONTRACTOR");

WITNESSETH:

WHEREAS, pursuant to the invitation of CITY, extended through a "Solicitation for Bids", CONTRACTOR submitted a Bid Proposal containing an offer invited by said solicitation; and

WHEREAS, CITY has determined that said offer was the lowest responsive Bid Proposal; and

WHEREAS, CITY has accepted CONTRACTOR's Bid Proposal;

NOW THEREFORE, the Parties to this Agreement, in consideration of the mutual covenants and stipulations set out, agree as follows:

**ARTICLE 1.
CONTRACT DOCUMENTS**

The Contract Documents which comprise the entire Agreement between CITY and CONTRACTOR concerning the work to be performed, are this Agreement, pages one (1) through six (6), and the following:

1. Advertisement for Bids;
2. Project Specifications titled: Booster Station Replacement – Phase II Rebid
City of Moscow Project No. 118-016
3. Bid/Proposal of CONTRACTOR, dated _____, attached to this Agreement;
4. The Engineering Plans;
5. Performance and Payment Bonds, and Insurance Certificates, physically attached to this Agreement;
6. Addenda issued prior to the opening of bids, to be physically attached to this Agreement;
7. Change Orders which may be delivered or issued after the effective date of this Agreement.

There are no Contract Documents other than those listed in Article 1. This Agreement may only be amended by change order as provided in the Project Specifications.

**ARTICLE 2.
WORK**

CONTRACTOR shall complete the entire work as specified, indicated, and required under the Contract Documents contained herein under Article 1., for CITY project (hereinafter "Project") titled:

"Booster Station Replacement – Phase II Rebid"

**ARTICLE 3.
CONTRACT TIME/SUBSTANTIAL COMPLETION**

The work to be performed pursuant to this Agreement shall be substantially completed within two hundred and seventy (270) calendar days of the notice to proceed, unless adjustment of the Agreement time is made in accordance with the provisions of the Contract Documents. Final Completion of all work shall be accomplished within thirty (30) calendar days after receiving Substantial Completion.

A suspension of Contract Time due to delays in equipment delivery time is allowed if necessary and if requested by Contractor. Contractor shall select the date for suspension of the Contract Time with an estimated date of the commencement of work. A second Notice to Proceed will be issued prior to the commencement of work post contract suspension. Only one suspension of Contract Time will be allowed.

CONTRACTOR and CITY recognize that time is of the essence and that CITY will suffer financial loss if the Project is not completed within the time specified above, unless approved extensions thereof are permitted in accordance with Article 12 of the General Conditions. The Parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by CITY if the Project is not completed on time. Accordingly, instead of requiring any such proof, CITY and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay CITY Three Thousand Dollars (\$3,000) for each day that expires after the time specified above for Substantial Completion until the Project is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining Project within the Time of Completion or by any proper extension thereof granted by CITY, CONTRACTOR shall pay CITY Three Thousand Dollars (\$3,000) for each day that expires after the time specified above for completion, until the Project is completed and ready for final payment.

**ARTICLE 4.
CONTRACT SUM**

CITY shall pay CONTRACTOR for completion of the Project in accordance with the Contract Documents in current funds in the amount of _____, as submitted by CONTRACTOR. In no event shall Contract amount exceed CONTRACTOR's bid amount of _____ unless otherwise authorized by CITY in writing. Any work additional to the current Agreement shall be compensated in accordance with pricing terms specified in the Bid Proposal and shall be agreed to by the Parties in writing. Said Contract Sum shall be paid in accordance with the Contract Documents.

**ARTICLE 5.
INDEPENDENT CONTRACTOR**

The Parties warrant by their signature that no employer-employee relationship is established between CONTRACTOR and CITY by the terms of this Agreement. It is understood by the Parties hereto that

Construction Agreement - 2

CONTRACTOR is an independent contractor and, as such, neither CONTRACTOR nor CONTRACTOR's employees, agents, representatives or Subcontractors, if any, are employees of CITY for purposes of tax, retirement system, or social security (FICA) withholding.

**ARTICLE 6.
SCOPE OF SERVICES**

CONTRACTOR shall perform all Work required by the Contract Documents. All Work shall be completed in accordance with the specifications and plans established for this Project.

**ARTICLE 7.
HOLD HARMLESS/INDEMNIFICATION**

In addition to other rights granted CITY by the Contract Documents, CONTRACTOR agrees to indemnify, defend, and hold harmless CITY, its officers, agents, employees, and engineers, from and against any and all losses, lawsuits, actions, claims, judgments for damages, or any injuries or damages received or sustained by any person, persons, or property and losses, and expenses, and other costs, including litigation costs and attorney's fees, arising out of, resulting from, or in connection with the acts and/or any performances, activities, errors or omissions by CONTRACTOR, CONTRACTOR's servants, agents, officers, employees, representatives, guests, business invitees or its Subcontractors; or on account of or in consequence of any neglect in safeguarding the Project; or through use of unacceptable materials in constructing the Project; or because of any claims or amounts recovered from any infringements of patent, trademark or copyright; or from any claims or amounts arising out of or recovered under the Workmen's Compensation Act or any other law, ordinance, order, or decree.

**ARTICLE 8.
CONFLICT OF INTEREST**

CONTRACTOR covenants that it presently has no interest and will not acquire any interest, direct or indirect, in the Project which would conflict in any manner or degree with the performance of CONTRACTOR's services hereunder. CONTRACTOR further covenants that, in performing this Agreement, CONTRACTOR will employ no person who has any such interest. Should any conflict of interest arise during the performance of this Agreement, CONTRACTOR shall immediately disclose such conflict to the Engineer and CITY.

**ARTICLE 9.
ENTIRE AGREEMENT, MODIFICATION AND ASSIGNABILITY**

This Agreement and the exhibits hereto contain the entire Agreement between the Parties, and no statements, promises, or inducements made by either Party, or agents of either Party are valid or binding unless contained herein. This Agreement may not be enlarged, modified or altered except upon written agreement signed by the Parties hereto. CONTRACTOR may not subcontract or assign its rights (including the right to compensation) or duties arising hereunder, other than as provided within the Contract Documents, without the prior written consent and express authorization of CITY.

**ARTICLE 10.
LICENSES AND ADHERENCE TO LAW REQUIRED**

CONTRACTOR represents that he possesses the skill and experience necessary and all licenses required to perform the Work under this Agreement. CONTRACTOR further agrees to comply with all applicable

Federal, State and Local Statutes and Regulations in the performance of the Work hereunder and are hereby made a part of this Agreement and shall be adhered to at all times. Violation of any of these statutes or regulations by CONTRACTOR shall be deemed material and shall subject CONTRACTOR to termination of this Agreement for cause. No pleas of misunderstanding or ignorance on the part of CONTRACTOR will in any way serve to modify the provisions of this requirement. CONTRACTOR and its surety shall indemnify, defend and hold harmless CITY and its employees, agents, engineers and representatives, against any claim or liability arising from or based on the violation of any such laws, codes, ordinances, or regulations, whether by CONTRACTOR, CONTRACTOR's employees, or its Subcontractors.

ARTICLE 11. EMPLOYMENT DISCRIMINATION

It is illegal under the U.S. Federal law to discriminate against an employee, either intentionally or through disparate impact, on account of race, color, gender, religion, sex (including pregnancy), national origin, physical or mental disability, age, marital or familial status, sexual orientation, and gender expression or identity. CONTRACTOR shall not discriminate against any employee or applicant for employment. CONTRACTOR's action under this Section shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training, including apprenticeship. CONTRACTOR agrees to post in conspicuous places, available to employees and other applicants for employment, notices setting forth the provisions of this non-discrimination Section.

ARTICLE 12. LEGAL FEES

In the event either Party incurs legal expenses to enforce the terms and conditions of this Agreement, the prevailing Party is entitled to recover attorney's fees and other costs and expenses, whether the same are incurred with or without a lawsuit.

ARTICLE 13. JURISDICTION, VENUE AND NONWAIVER

It is agreed that this Agreement shall be construed under and governed by the laws of the State of Idaho. In the event of litigation concerning it, it is agreed that proper venue shall be the District Court of the Second Judicial District of the State of Idaho, in and for the County of Latah. Failure of CITY to exercise any of the rights under this Agreement, or breach thereof, shall not be deemed to be a waiver of such right or a waiver of any subsequent breach.

ARTICLE 14. SPECIAL WARRANTY

CONTRACTOR warrants that nothing of monetary value has been given, promised, or implied as remuneration or inducement to enter into the Agreement. CONTRACTOR declares that no improper personal, political or social activities have been used or attempted in an effort to influence the outcome of the competition, discussion, or negotiation leading to the award of this Agreement. Any such activity by CONTRACTOR shall make this Agreement null and void. CONTRACTOR further warrants that all materials and goods supplied under this Agreement shall be of good merchantable quality and that all

services will be performed in a good workmanlike manner. CONTRACTOR acknowledges that it will be liable for any breach of this warranty.

**ARTICLE 15.
COMMUNICATIONS**

Such communications as are required by this Agreement shall be satisfied by mailing or by personal delivery to the Parties at the following addresses:

Contractor:

City:

City Engineer
City of Moscow
206 East Third Street
P O Box 9203
Moscow, Idaho 83843

**ARTICLE 16.
NON-APPROPRIATIONS**

This Agreement is contingent upon CITY receiving the necessary funding to cover the obligations of CITY. In the event that such funding is not received or appropriated, then, and in that event, CITY's obligations under this Agreement shall cease and each Party shall be released from further performance under this Agreement without any liability to the other Party, and CONTRACTOR shall be entitled to receive just and equitable compensation for any Work satisfactorily completed hereunder.

**ARTICLE 17.
APPROVAL REQUIRED AND SEVERABILITY**

This Agreement shall not become effective or binding until approved by the CITY. If any part of this Agreement is held unenforceable, the remaining portions of the Agreement will, nevertheless, remain in full force and effect.

ARTICLE 18.
EXECUTION

IN WITNESS WHEREOF, said CONTRACTOR and CITY have caused this Agreement to be executed on the day and year first above written.

CONTRACTOR

CITY

City of Moscow, Idaho

By:

Bill Lambert, Mayor

ATTEST:

By:

Laurie M. Hopkins, City Clerk

Approved As To Form:

Mia Bautista, City Attorney

ACKNOWLEDGMENT

STATE OF _____)
) ss:
County of _____)

On this ____ day of _____, 2021, before me, the undersigned, a Notary in and for said State, personally appeared _____ and _____ known to me to be the person(s) whose name(s) is/are subscribed to the foregoing Agreement and acknowledged to me that he/she/they executed the same in his/her/their capacity as _____ for _____.

(seal)

Notary Public residing at: _____
My commission expires: _____

Notice to Proceed

Date: _____

Project: Booster Station Replacement – Phase II Rebid

Owner: City of Moscow, Idaho

Owner's Contract No.: 118-016

Contract: Booster Station Replacement – Phase II Rebid

Engineer's Project No.: 21-18-022

Bidder:

Bidder's Address: *[send Notice of Award Certified Mail, Return Receipt Requested]*

You are notified that the Contract Times under the above Contract will commence to run on _____. On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is _____, and the date of readiness for final payment is _____ [(or) the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____].

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds and loss payees) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

_____ *[add other requirements]*.

Owner: City of Moscow, Idaho

Given by:

Authorized Signature

Title

Date

Copy to Engineer

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PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

CONTRACT

Effective Date of Agreement:

Amount (Figures):

Description (*Name and Location*):

BOND

Bond Number:

Date (*Not earlier than Effective Date of Agreement*):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

(Seal)
Contractor's Name and Corporate Seal

(Seal)
Surety's Name and Corporate Seal

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.

1. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 2.1.
2. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
 - 2.1 Owner has notified Contractor and Surety, at the addresses described in Paragraph 9 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor, and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
 - 2.2 Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 2.1; and
 - 2.3 Owner has agreed to pay the Balance of the Contract Price to:
 1. Surety in accordance with the terms of the Contract; or
 2. Another contractor selected pursuant to Paragraph 3.3 to perform the Contract.
3. When Owner has satisfied the conditions of Paragraph 2, Surety shall promptly, and at Surety's expense, take one of the following actions:
 - 3.1 Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
 - 3.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
 - 3.3 Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 5 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
 - 3.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
 1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
 2. Deny liability in whole or in part and notify Owner citing reasons therefor.
4. If Surety does not proceed as provided in Paragraph 3 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 3.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.
5. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 3.1, 3.2, or 3.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To the limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

- 5.1 The responsibilities of Contractor for correction of defective Work and completion of the Contract;
- 5.2 Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions of or failure to act of Surety under Paragraph 3; and
- 5.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

6. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.

7. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.

8. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located, and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

9. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

10. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

11. Definitions.

- 11.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
- 11.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
- 11.3 Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
- 11.4 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – *(Name, Address and Telephone)*

Surety Agency or Broker:

Owner's Representative *(Engineer or other party)*:

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PAYMENT BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

CONTRACT

Effective Date of Agreement:

Amount (Figures):

Description (*Name and Location*):

BOND

Bond Number:

Date (*Not earlier than Effective Date of Agreement*):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal

Surety's Name and Corporate Seal

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.
 2. With respect to Owner, this obligation shall be null and void if Contractor:
 - Promptly makes payment, directly or indirectly, for all sums due Claimants, and
 - Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.
 3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.
 4. Surety shall have no obligation to Claimants under this Bond until:
 - Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
 - Claimants who do not have a direct contract with Contractor:
 1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
 2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and
 3. Not having been paid within the above 30 days, have sent a written notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.
 5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.
 6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at Surety's expense take the following actions:
 - Send an answer to that Claimant, with a copy to Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
 - Pay or arrange for payment of any undisputed amounts.
 7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.
 8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the
-
- 2010 ISPMC 00615
Modified From EJCDC C-615 Payment Bond
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-
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Page 131

Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.

9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders, and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions

Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract, or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (*Name, Address, and Telephone*)

Surety Agency or Broker:

Owner's Representative (*Engineer or other*):

Form WH-5 Public Works Contract Report

Contractors awarded Idaho public works contracts must submit this form to the Tax Commission within 30 days of receiving the award. (Idaho Code sections 54-1904A and 63-3624(g)).

Contract awarded by (public body and address)

Contract awarded to (contractor's name and address)

State of incorporation	Federal Employer Identification Number (EIN)	Date qualified to do business in Idaho
Business operates as ☐ Sole Proprietorship ☐ Partnership ☐ Corporation ☐ LLC		Public works contractor license number
Sole proprietor's Social Security number	Idaho sellers permit number	Idaho withholding tax permit number
Awarding agency project number		Amount of contract \$
Description and location of work to be performed		

Project Dates

Scheduled project start date: _____ Completion date: _____

If the following information isn't available at this time, please enter date it will be: _____

All Subcontractors

Name			Federal EIN
Address			Public works contractor license number
City	State	ZIP Code	Amount of subcontract \$
Description of work			
Name			Federal EIN
Address			Public works contractor license number
City	State	ZIP Code	Amount of subcontract \$
Description of work			
Name			Federal EIN
Address			Public works contractor number
City	State	ZIP Code	Amount of subcontract \$
Description of work			
Name			Federal EIN
Address			Public works contractor license number
City	State	ZIP Code	Amount of subcontract \$
Description of work			

All Subcontractors (continued)

Name			Federal EIN	
Address			Public works contractor license number	
City	State	ZIP Code	Amount of subcontract \$	
Description of work				

Name			Federal EIN	
Address			Public works contractor license number	
City	State	ZIP Code	Amount of subcontract \$	
Description of work				

Name			Federal EIN	
Address			Public works contractor license number	
City	State	ZIP Code	Amount of subcontract \$	
Description of work				

Suppliers

List your major suppliers of materials, equipment, and supplies. Include items removed from inventory and items provided to you by the government agency for use in this project.

Name		Federal EIN	Total value \$
Address		Materials and equipment purchased and used	
City, State, ZIP Code	Phone number	Please select how sales or use tax was paid. ☐ Tax paid to supplier ☐ Tax paid to state* ☐ No tax was paid	

Name		Federal EIN	Total value \$
Address		Materials and equipment purchased and used	
City, State, ZIP Code	Phone number	Please select how sales or use tax was paid. ☐ Tax paid to supplier ☐ Tax paid to state* ☐ No tax was paid	

Name		Federal EIN	Total value \$
Address		Materials and equipment purchased and used	
City, State, ZIP Code	Phone number	Please select how sales or use tax was paid. ☐ Tax paid to supplier ☐ Tax paid to state* ☐ No tax was paid	

*If you're reporting any untaxed materials, equipment, or supplies as "items subject to use tax" on your Idaho return, provide the period when you did or will report it: _____

If you paid tax to a state other than Idaho, write the name state next to "total value" boxes, above. For any tax due that you haven't reported yet, include payment with this form. You can make copies of this form if you need more room.

Sign Here	Authorized signature	Print name	Phone number	Date
------------------	----------------------	------------	--------------	------

File with the Idaho State Tax Commission, PO Box 36, Boise ID 83722-0410
 For more information, call (208) 334-7618 | Fax: (208) 332-6619 | Email: contractdesk@tax.idaho.gov

Contractor's Application for Payment No.

Application Period:		Application Date:	
To (Owner):	From (Contractor):	Via (Engineer):	
Project:	Contract:		
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:	

Application For Payment Change Order Summary

Approved Change Orders			
Number	Additions	Deductions	
			1. ORIGINAL CONTRACT PRICE..... \$ _____
			2. Net change by Change Orders..... \$ _____
			3. Current Contract Price (Line 1 ± 2)..... \$ _____
			4. TOTAL COMPLETED AND STORED TO DATE
			(Column F on Progress Estimate)..... \$ _____
			5. RETAINAGE:
			a. X _____ Work Completed..... \$ _____
			b. X _____ Stored Material..... \$ _____
			c. Total Retainage (Line 5a + Line 5b)..... \$ _____
			6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)..... \$ _____
			7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)..... \$ _____
			8. AMOUNT DUE THIS APPLICATION..... \$ _____
			9. BALANCE TO FINISH, PLUS RETAINAGE
			(Column G on Progress Estimate + Line 5 above)..... \$ _____
TOTALS			
NET CHANGE BY			
CHANGE ORDERS			

Contractor's Certification

The undersigned Contractor certifies that to the best of its knowledge: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By:

Date:

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ (Date)
(Engineer)

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____ (Date)
(Owner)

Approved by: _____ (Date)
Funding Agency (if applicable)

Progress Estimate

Contractor's Application For Payment No.

[illegible]

Certificate of Substantial Completion

Project: Booster Station Replacement – Phase II Rebid

Owner: City of Moscow, Idaho

Owner's Contract No.: 118-016

Contract: Booster Station Replacement – Phase II Rebid

Engineer's Project No.: 21-18-022

This [tentative] [definitive] Certificate of Substantial Completion applies to:

☒ All Work under the Contract Documents:

☒ The following specified portions of the Work:

Date of **[tentative] [definitive]** Substantial
Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

☐ Amended Responsibilities

☐ Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer	Date

Accepted by Contractor	Date

Accepted by Owner	Date

Work Change Directive

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.: 118-016
Contract:		Date of Contract:
Contractor:		Engineer's Project No.: 21-18-022

Contractor is directed to proceed promptly with the following change(s):

Item No.	Description

Attachments (list documents supporting change):

Purpose for Work Change Directive:

Authorization for Work described herein to proceed on the basis of Cost of the Work due to:

- ☐ Nonagreement on pricing of proposed change.
- ☐ Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

Estimated change in Contract Price and Contract Times:

Contract Price \$ _____ (increase/decrease) Contract Time _____ (increase/decrease)
days

If the change involves an increase, the estimated amount is not to be exceeded without further authorization

Recommended for Approval by Engineer:	Date
Authorized for Owner by:	Date
Received for Contractor by:	Date
Received by Funding Agency (if applicable):	Date:

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Change Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.: 118-016
Contract:		Date of Contract:
Contractor:		Engineer's Project No.: 21-18-022

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIMES:	
Original Contract Price: \$ _____	Original Contract Times: ☐ Working days ☐ Calendar days Substantial completion (days or date): _____ Ready for final payment (days or date): _____	
[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: \$ _____	[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: Substantial completion (days): _____ Ready for final payment (days): _____	
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____	
[Increase] [Decrease] of this Change Order: \$ _____	[Increase] [Decrease] of this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____	
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial completion (days or date): _____ Ready for final payment (days or date): _____	
RECOMMENDED: By: _____ Engineer (Authorized Signature) Name: _____ <u>Print Name</u> Date: _____ Approved by Funding Agency (if applicable):	ACCEPTED: By: _____ Owner (Authorized Signature) Name: _____ <u>Print Name</u> Date: _____	ACCEPTED: By: _____ Contractor (Authorized Signature) Name: _____ <u>Print Name</u> Date: _____

Change Order

Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

Field Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.: 118-016
Contract:		Date of Contract:
Contractor:		Engineer's Project No.: 21-18-022

Attention:

You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.04.A, for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work.

Reference: _____
(Specification Section(s)) (Drawing(s) / Detail(s))

Description:

Attachments:

Engineer:

Signature: _____

Print Name: _____

Receipt Acknowledged by Contractor:

Date:

Signature: _____

Print Name: _____

Copy to Owner

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Section 2

General Conditions

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This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

ISPWC DIVISION 100 – STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Modified From

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

2012 IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ISPWC)

NOTE: The base document is the 2007 EJCDC version. Items added to EJCDC to form the 2012 ISPWC are underlined. Items deleted from the EJCDC to form the 2012 ISPWC are shown in strikeout format.

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by



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AMERICAN SOCIETY OF CIVIL ENGINEERS

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Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
 12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
 13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
 14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
- 42.a *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
- 42.b. *Standard Specifications*—Wherever in these Contract Documents reference is made to the Standard Specifications, said reference shall be understood as referring to the Idaho Standards for Public Works Construction which applicable parts are incorporated herein and made a part of these Documents by specific reference thereto. If requirements contained in the Standard Specifications are modified by or are in conflict with supplemental information in these Contract Documents, the requirements of these Contract Documents shall prevail.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.

47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

- A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

- B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.
2. “Command” type language is used in the Contract Documents. This command language refers to, and is directed to the Contractor.

- C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

- D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or

- b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
- c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

- 1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - 2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - 3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 2. a preliminary Schedule of Submittals; and
 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 - 1. A Field Order;
 - 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
 - 3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
 - 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if

any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

- A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:
 - 1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
 - 2. is of such a nature as to require a change in the Contract Documents; or
 - 3. differs materially from that shown or indicated in the Contract Documents; or
 - 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

- B. *Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.
- C. *Possible Price and Times Adjustments:*
1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
 3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

- A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and

- d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be

within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

1. The Contractor's scope of work shall include implementation of necessary safety, public health and environmental procedures and requirements relating to sanitary sewage encountered during the work.
 2. The Contractor's scope of work shall include necessary safety and environmental requirements for handling and disposal of asbestos pipe removed from service or excavated during the course of the work.
- D. If Contractor encounters a Hazardous Environmental Condition not indicated in the Drawings or Specifications or identified in the Contract Documents or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligent acts or omissions ~~negligence~~.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions. Surety and insurance companies from which the bonds and insurance for this Project are purchased shall have a Best's rating of no less than A:VII, in addition to the other requirements specified herein.

5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
 2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
 3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
 4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
 5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07;
 6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.

- b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuing coverage during the two year period of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

NOTES TO USER

The Owner, in consultation with their attorney and risk manager, should choose which party shall provide property insurance. In accordance with the Owner's direction, use the appropriate Section A below.

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
 - 2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;
 - 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 - 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 - 5. allow for partial utilization of the Work by Owner;
 - 6. include testing and startup; and
 - 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.
- A. Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. This insurance shall:
 - 1. include the interests of Owner, Contractor, Subcontractors, Engineer, Engineer's Consultants and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners,

employees, agents and other consultants and subcontractors of any of them each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, falsework, and materials and equipment in transit and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. ~~Owner~~Contractor shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- ~~D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.~~
- D. Contractor shall be responsible for any deductible or self-insured retention.
- ~~E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.~~
- E. If Owner requests in writing that other special perils be included in the property insurance policies provided under paragraphs 5.06.A or 5.06.B of the General Conditions, Contractor shall, if possible, include such insurance, and the cost thereof will be charged to Owner by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the site, Contractor shall in writing advise Owner whether or not such other insurance has been procured by Contractor.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing

within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit ~~overtime work~~ or the performance of Work outside the regular working hours or on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties, special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and “Or-Equals”*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or “or-equal” item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
 - 1. *“Or-Equal” Items:* If in Engineer’s sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an “or-equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and,
 - 3) it has a proven record of performance and availability of responsive service.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
 - 2. *Substitute Items:*
 - a. If in Engineer’s sole discretion an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
 - b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable

substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
 - d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
 - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier ~~who is listed as a loss payee~~ whose interests are included on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the

Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents..

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.
- D. While not intended to be inclusive of all Laws or Regulations for which Contractor may be responsible under paragraph 6.09, the following Laws or Regulations are included as mandated by statute or for the convenience of the Contractor:

Idaho Code Section 63-1501. Definitions. As used in this act, the following terms shall have the following meanings:

“Contracting units” shall include the state or any officer or department thereof, the counties or other subdivisions of the state, and all municipal and quasi-municipal corporations therein.

“Contractor” shall mean any person, firm, co-partnership, association, or corporation, foreign or domestic, entering into a contract for the construction, erection, repair, or improvement of any kind or character of public works in this state.

“Taxes” shall mean all taxes, assessments, excises, and license fees authorized to be levied, assessed, and collected under the laws of this state, other than taxes on real property.

“Taxing unit” shall mean the state or any officer or department thereof, the counties or other subdivisions of the state, and all municipal and quasi-municipal corporations therein authorized by law to assess, levy and collect taxes.

Idaho Code Section 63-1502. Conditions precedent to contract for public works. Before entering into a contract for the construction of any public works in this state, the contracting unit shall require as conditions precedent that the contractor be authorized to do business in this state and that he furnish satisfactory evidence that he has paid or secured to the satisfaction of the respective taxing units all taxes for which he or his property is liable then due or delinquent.

Idaho Code Section 63-1503. Contractor for public works to pay or secure taxes—Agreement. Every contract for the construction of public works by a contracting unit of this state shall contain substantially the following provisions:

The contractor, in consideration of securing the business of erecting or constructing public works in this state, recognizing that the business in which he is engaged is of a transitory character, and that in the pursuit thereof, his property used therein may be without the state when taxes, excises, or license fees to which he is liable become payable, agrees:

1. To pay promptly when due all taxes (other than on real property), excises and license fees due to the state, its subdivisions, and municipal and quasi-municipal corporations therein accrued or accruing during the term of this contract, whether or not the same shall be payable at the end of such term;
2. That if the said taxes, excises, and license fees are not payable at the end of said term, but liability for the payment thereof exists, even though the same constitute liens upon his property, to secure the same to the satisfaction of the respective officers charged with the collection thereof; and
3. That in the event of his default in the payment or securing of such taxes, excises, and license fees, to consent that the department, officer, board, or taxing unit entering into this contract may withhold from any payment due him hereunder the estimated amount of such accrued and accruing taxes, excises, and license fees for the benefit of all taxing units to which said contractor is liable.

Idaho Code Section 44-1002 requires the following: The Contractor must employ ninety-five percent (95%) bona fide Idaho residents as employees on any job under any such contract except where under such contracts fifty (50) or less persons are employed, the Contractor may employ ten percent (10%) nonresidents, provided, however, in all cases employers must give preference to the employment of bona fide residents in the performance of said work, and no contract shall be let to any person, firm, association, or corporation refusing to execute an agreement with the above mentioned provisions in it; provided, that, in contracts involving the expenditure of federal aid funds this act shall not be enforced in such a manner as to conflict with or be contrary to the federal statutes prescribing a labor preference to honorably discharged soldiers, sailors, and marines, prohibiting as unlawful any other preference or discrimination among citizens of the United States.

Idaho Code Chapter 19 of Title 54 requires proper licensing of Public Works Contractors.

6.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.
- B. In the event of the Contractor's default on the payment of taxes, excises, and license fees as set forth in Idaho Code 63-1503 , the Owner shall have the authority to withhold from any payment due the Contractor under this contract, the estimated amount of such accrued and accruing taxes, excises, and license fees for the benefit of all taxing authorities to which said Contractor is liable.

6.11 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas

- 1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work. Contractor shall not enter upon nor use property not under Owner control until appropriate easements have been executed and a copy is on file at the site.
 - 2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
 - 3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
1. all persons on the Site or who may be affected by the Work;
 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.
 - 1. *Shop Drawings:*
 - a. Submit number of copies specified in the General Requirements.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.
 - 2. *Samples:*
 - a. Submit number of Samples specified in the Specifications.
 - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Submittal Procedures:*
 - 1. Before submitting each Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

- b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
- 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
 - 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. Engineer's Review:

- 1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
- 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
- 3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. Resubmittal Procedures:

- 1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 - 1. observations by Engineer;
 - 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. use or occupancy of the Work or any part thereof by Owner;
 - 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
 - 6. any inspection, test, or approval by others; or
 - 7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

6.22 *Quality Control*

- A. Contractor shall provide quality control, which shall include the initial and subsequent inspections of Contractor's Work to ensure that the Work conforms to the Contract Documents.
- B. Contractor shall designate the person responsible for Contractor's quality control while Work is in progress, and shall notify Engineer, in writing, prior to any change in quality control representative assignment.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
 1. written notice thereof will be given to Contractor prior to starting any such other work; and
 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a

reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
 - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful actions or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER’S STATUS DURING CONSTRUCTION

9.01 *Owner’s Representative*

- A. Engineer will be Owner’s representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner’s representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor’s executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer’s efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer’s visits and observations are subject to all the limitations on Engineer’s authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer’s visits or observations of Contractor’s Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer’s consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.
- F. Contractors, Subcontractors, Suppliers and others on the Project, or their sureties, shall maintain no direct action against the Engineer, its officers, employees, affiliated corporations, and subcontractors, for any claim arising out of, in connection with, or resulting from the engineering services performed. Only the Owner will be the beneficiary of any undertaking by the Engineer.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
 - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 Notification to Surety

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 Claims

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than ~~30~~ 10 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within ~~60~~ 20 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within ~~30~~ 10 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within ~~30~~ 20 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
 - 1. deny the Claim in whole or in part;
 - 2. approve the Claim; or
 - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said ~~30~~ 21 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 Cost of the Work

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality

of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in

accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

- 1. Contractor agrees that:

- a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
- b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

- 1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
 - 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or
2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the claim to the Engineer and the other party to the Contract in accordance with the provisions of paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. ~~Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:~~ Contractor shall employ an independent testing laboratory or testing agency and shall be responsible for arranging and shall pay for all specified tests, inspections, and approvals (including tests, inspections, and approvals to be paid for on a cash allowance basis) required for Owner's and Engineer's acceptance of the Work at the site except:
 - 1. ~~for inspections, tests, or approvals covered by paragraphs 13.03.C and 13.03.D below; costs incurred in connection with tests or inspections pursuant to paragraph 13.04.B of the General Conditions shall be paid for as provided in said paragraph; and as otherwise specifically provided in the Contract Documents.~~
 - 2. ~~that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.04.B shall be paid as provided in said paragraph 13.04.C; and,~~

~~3. as otherwise specifically provided in the Contract Documents.~~

- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.
- F. Uncovering Work as provided in paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not

limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's warranty, special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be

entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

- A. *Applications for Payments:*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications:*

1. Engineer will, within 7 ~~40~~ days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner referred to in Paragraph 14.02.B.2. Engineer may also

refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

1. ~~Ten~~ Twenty-one days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment:

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items including, but not limited to, liquidated damages entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars

in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. Application for Payment:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Engineer's Review of Application and Acceptance:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due:

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if, within 7 days of receipt of notice of intent to terminate, Contractor begins to correct its failure to perform and proceeds diligently to cure such failure and become in compliance with the contract requirements. Such cure must occur within no more than 30 days of said notice unless otherwise extended by the Engineer. Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
 - 1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 - 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

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Section 3

Supplementary Conditions

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City of Moscow
Booster Station Replacement – Phase II Rebid

Supplementary Conditions

These Supplementary Conditions amend or supplement the General Conditions of the Construction Contract (ISPWC Division 100, 2012 edition). All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

SC-1.01.A.2. Add the following language at the end of Paragraph 1.01.A.2:

The Agreement may also be referred to as "Contract" within these Contract Documents.

SC-1.01.A.3. Add the following language at the end of Paragraph 1.01.A.3:

The Application for Payment form to be used on this Project is included in the contract package.

SC-1.01.A.9. Add the following language at the end of Paragraph 1.01.A.9:

The Change Order form to be used on this Project is included in the contract package.

SC-1.01.A.19. Delete paragraph 1.01.A.19 in its entirety and insert the following in its place:

ENGINEER:

J-U-B ENGINEERS, Inc.
201 S. Jackson St.
Moscow, ID 83843
(208) 746-9010

who is hereinafter called Engineer and who is to act as Owner's representative, assume all duties and responsibilities and have the rights and authority assigned to Engineer in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

SC-1.01.A.20. Add the following language at the end of Paragraph 1.01.A.20:

The Field Order form to be used on this Project is included in the contract package.

SC-1.01.A.44. Supplement Paragraph 1.01.A.44 as follows:

Substantial Completion is further defined as (i) that degree of completion of the Project's operating facilities or systems sufficient to provide the Owner the full time, uninterrupted, and continuous beneficial operation of the Work; and (ii) all inspections required have been completed and identified defective Work replaced or corrected.

SC-1.01.A.51. Add the following language at the end of Paragraph 1.01.A.51:

The Work Change Directive form to be used on this Project is included in the contract package.

SC-1.01.A.52. Add the following new paragraph immediately after paragraph 1.01.A.51:

52. *Request for Information* – A written request for information, requiring a written response, to Owner, Engineer, or Contractor, initiated by Owner, Engineer, or Contractor.

SC-2.02. Delete paragraph 2.02.A in its entirety and insert the following in its place:

Owner shall furnish to the Contractor three (3) compact discs of Contract Documents which will contain plans, specifications and addenda. Conformed documents incorporating responses and Addenda developed during the bidding process will not be provided.

SC-2.05.B. Add the following new paragraph immediately after Paragraph 2.05.A:

B. Within the time frame noted in the Notice of Award, the Bidder to whom the award is made, shall execute and return the Agreement in the required number of copies, shall furnish the required Payment and Performance Bonds, the original plus one copy of completed WH-5 Public Works Contract Report, and shall provide certificates of insurance (and other evidence of insurance which the Owner and any additional insured may reasonably request) with copies to each additional insured identified in the Supplementary Conditions which Contractor is required to purchase and maintain in accordance with Article 5 of the General Conditions.

SC-2.06. Amend the first sentence of Paragraph 2.06.A. to read as follows:

A. Within 20 days after the Effective Date of the Agreement, but before any Work at the site is started, a conference...

SC-3.01. Add the following new paragraphs immediately after Paragraph 3.01.C:

D. The Specifications may vary in form, format and style. Some specification sections are written in varying degrees of streamlined or declarative style and some sections may be relatively narrative by comparison. Omissions of such words and phrases as "the Contractor shall," "in conformity with," "as shown," or "as specified" are intentional in streamlined sections. Omitted words and phrases shall be supplied by inference. Similar types of provisions may appear in various parts of a section or articles within a part depending on the format of a section. The Contractor shall not take advantage of any variation of form, format or style in making claims for extra work.

- E. The cross referencing of specification sections under the subparagraph heading “Related Sections include but are not necessarily limited to:” and elsewhere within each specification section is provided as an aid and convenience to the Contractor. The Contractor shall not rely on the cross referencing provided and shall be responsible to coordinate the entire work under the Contract Documents and provide a complete Project whether or not the cross referencing is provided in each section or whether or not the cross referencing is complete.

SC-4.02. Add the following new paragraphs immediately after Paragraph 4.02.B:

- C. In the preparation of Drawings and Specifications, Engineer or Engineer’s Consultants relied upon the following reports of explorations and tests of subsurface conditions at the Site: Geotechnical Report included in Volume II Appendix B.
- D. In the preparation of Drawings and Specifications, Engineer or Engineer’s Consultants relied upon the following drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities), which are at or contiguous to the Site:
 - 1. Not Applicable

Copies of reports and drawings itemized in SC-4.02.C and SC-4.02.D that are not included with Bidding Documents may be examined at the offices of J-U-B ENGINEERS, Inc. during regular business hours. These reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which the Contractor may rely as identified and established above are incorporated therein by reference. Contractor is not entitled to rely upon any other information and data known to or identified by Owner or Engineer.

SC-4.05.A Add the following to the end of the paragraph:

- A. At the discretion of the Owner, any stakes or benchmarks that are not protected by the Contractor and are ultimately destroyed or disturbed by the Contractor will be replaced by the Owner and the cost charged to the Contractor.

SC-4.05. Add the following new paragraph immediately after Paragraph 4.05.A:

- B. The Owner shall provide engineering surveys to establish the following reference points for construction control: As indicated in the Contract Documents.

SC-4.06. Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:

- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
- B. Not Used.

~~**SC 4.06.G.** Delete Paragraph 4.06.G in its entirety.~~

SC-5.04.B. Amend Paragraph 5.04.B.1 by striking out the following words:

~~“...and Engineer,”~~

SC-5.04.C. Add the following new paragraph immediately after paragraph 5.04.B:

C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation and related coverages under paragraphs 5.04.A.1. and 5.04.A.2 of the General Conditions:

- | | | |
|----|---|--------------------|
| a. | State: | Statutory |
| b. | Applicable Federal
(e.g., Longshoreman's): | Statutory |
| c. | Employer's Liability: | <u>\$1,000,000</u> |

2. Contractor's General Liability (under paragraphs 5.04.A.3. through 5.04.A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:

- | | | |
|----|--|--------------------|
| a. | General Aggregate | <u>\$2,000,000</u> |
| b. | Products - Completed
Operations Aggregate | <u>\$1,000,000</u> |
| c. | Personal and Advertising
Injury | <u>\$1,000,000</u> |
| d. | Each Occurrence
(Bodily Injury and
Property Damage) | <u>\$1,000,000</u> |
| e. | Property Damage liability insurance will provide
Explosion, Collapse, and Under-ground coverages
where applicable. | |
| f. | Excess or Umbrella Liability | |
| | ☒ General Aggregate | <u>\$1,000,000</u> |
| | ☐ Each Occurrence | <u>\$_____</u> |

3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:

- | | | |
|----|--------------------------|--------------------|
| a. | Combined Single Limit of | <u>\$1,000,000</u> |
|----|--------------------------|--------------------|

4. The Contractual Liability coverage required by Paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts:

- a. Bodily Injury:
 - Each person \$1,000,000
 - Each Accident \$1,000,000
- b. Property Damage:
 - Each Accident \$1,000,000
 - Annual Aggregate \$1,000,000

SC-5.06 CONTRACTOR shall purchase and maintain property insurance upon the Work at the site. Consequently, delete Paragraph 5.06.A regarding OWNER-provided property insurance; retain Paragraph 5.06.A regarding CONTRACTOR-provided property insurance.

~~**SC 5.06.A.1** Amend Paragraph 5.06.A.1 by striking out the following words:~~

~~“Engineer” and “Engineer’s Consultants”~~

~~**SC 5.06.B** Amend Paragraph 5.06.B by striking out the following words:~~

~~“...and Engineer,”~~

~~**SC 5.07.** Delete Paragraph 5.07 in its entirety.~~

SC-5.10. Add the following new paragraphs immediately after Paragraph 5.10.A:

- B. All insurance required by the Contract Documents, or by law or regulations shall remain in full force and effect on all phases of the Work, whether or not the Work is occupied or utilized by Owner, until all Work included in the agreement has been completed and final payment has been made.
- C. Nothing contained in the insurance requirements shall be construed as limiting the extent of Contractor’s responsibility for payment of damages resulting from his operations under the Contract. Contractor agrees that he alone shall be completely responsible for procuring and maintaining full insurance coverage as provided herein or as may be otherwise required by the Contract Documents. Any approval by Owner or Engineer shall not operate to the contrary.

SC-6.02.B. Supplement Paragraph 6.02.B of the General Conditions as follows:

Contractor (and Subcontractors) regular working hours shall be limited to the hours of 7:00 a.m. to 6:00 p.m weekdays only unless otherwise approved by the Owner.

If work beyond the contract hours is approved, Contractor shall pay for Construction Observation and Construction Management.

~~**SC 6.07.** Delete Paragraphs 6.07.B and 6.07.C in their entirety.~~

SC-6.17. Amend all paragraphs of 6.17 by striking out “review and approval” and replacing with “review for general compliance.”

SC-6.17.D. Add the following new paragraphs immediately after Paragraph 6.17.D.3:

4. Engineer’s review of Shop Drawings and Samples, Standard Specifications and descriptive literature submitted by Contractor will be only for general conformance with design concept, except as otherwise provided, and shall not be construed as:
 - a. permitting any departure from the Contract Requirements;
 - b. relieving Contractor of the responsibility for any error in details dimensions or otherwise that may exist in such submittals;
 - c. constituting a blanket approval of dimensions, quantities, or details of the material or equipment shown; or
 - d. approving departures from additional details or instructions previously furnished by Engineer. Such check or review shall not relieve Contractor of the full responsibility of meeting all of the requirements of the Contract Documents.”

SC-6.17 Add the following new paragraphs immediately after Paragraph 6.17.E:

- F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer’s time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer’s charges for such time.
- G. In the event that Contractor requests a change of a previously approved item, Contractor shall reimburse Owner for Engineer’s charges for its review time unless the need for such change is beyond the control of Contractor.

~~**SC-6.20.A.** Amend the first sentence of Paragraph 6.20.A to read as follows:~~

~~“...Contractor shall indemnify and hold harmless Owner and the officers...”~~

~~**SC-6.20.B.** Amend the first sentence of Paragraph 6.20.B to read as follows:~~

~~“In any and all claims against Owner or any of Owner’s officers...”~~

SC-7.01.D. Add the following new paragraphs immediately following Paragraph 7.01.C:

D. The Owner shall let as separate contract or perform work themselves, in the same general timeframe as this project, the following project(s) that will require coordination by the Contractor:

1. None

~~**SC-8.02.A.** Amend Paragraph 8.02.A by striking out the following words:~~

~~“...to whom Contractor makes no reasonable objection,....”~~

SC-9.03. Add the following new paragraphs immediately following Paragraph 9.03.A:

B. The Resident Project Representative (RPR) will be Engineer's employee or agent at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall be through or with the full knowledge and approval of Contractor. The RPR shall:

1. *Schedules:* Review the progress schedule, schedule of Shop Drawing and Sample submittals, and schedule of values prepared by Contractor and consult with Engineer concerning acceptability.
2. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.
3. *Liaison:*
 - a. Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, assist in providing information regarding the intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
4. *Interpretation of Contract Documents:* Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
5. *Shop Drawings and Samples:*
 - a. Record date of receipt of Samples and approved Shop Drawings.

- b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
- 6. *Modifications:* Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
- 7. *Review of Work and Rejection of Defective Work:*
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
- 8. *Inspections, Tests, and System Startups:*
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
 - b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.
- 9. *Records:*
 - a. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
 - b. Maintain records for use in preparing Project documentation.
- 10. *Reports:*
 - a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of Shop Drawing and Sample submittals.
 - b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition.

11. *Payment Requests:* Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

12. *Certificates, Operation and Maintenance Manuals:* During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

13. *Completion:*

- a. Participate in a Substantial Completion inspection, assist in the determination of Substantial Completion and the preparation of lists of items to be completed or corrected.
- b. Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final list of items to be completed and deficiencies to be remedied.
- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the Notice of Acceptability of the Work.

C. The RPR shall not:

- 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
- 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
- 3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor's superintendent.
- 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work unless such advice or directions are specifically required by the Contract Documents.
- 5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

~~SC-9.09.F~~ Delete Paragraph 9.09.F in its entirety.

SC-12.01 C.2.a. Add the following to the end of Paragraph 12.01.C.2.a. as follows:

said 15 percent shall include all taxes and any additional insurance and bond costs.

SC-12.01 C.2.b. Add the following to the end of Paragraph 12.01.C.2.b. of the General Conditions as follows:

said five percent shall include all taxes and any additional insurance and bond costs.

SC-12.01 C.2.c. Add the following to the end of Paragraph 12.01.C.2.c. of the General Conditions as follows:

, except the maximum total allowable cost to OWNER shall be the Cost of the Work plus a maximum collective aggregate fee for CONTRACTOR and all tiered Subcontractors of 20 percent.

SC-13.03. Add the following new paragraphs immediately after Paragraph 13.03.F:

- G. For each test CONTRACTOR causes to be performed on-site, the CONTRACTOR shall furnish to ENGINEER a copy of the record of test(s) in accordance with Section 01300, SUBMITTALS.
- H. OWNER reserves the right to hire its own independent testing laboratory for quality assurance.
- I. The CONTRACTOR's independent testing laboratory(ies) for Quality Control or Quality Assurance purposes shall meet the following applicable requirements:
 1. Basic requirements of ASTM E 329, "Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials as Used in Construction" and ASTM D 3666, "Standard Specification for Minimum Requirements for Agency Testing and Inspecting Bituminous Paving Materials," as applicable.
 2. Calibrate testing equipment at reasonable intervals by devices of accuracy traceable to either the national Bureau of Standards or accepted values of natural physical constants.
- J. Contractor shall arrange, schedule and coordinate with appropriate agenc(ies) and testing laboratory(s) for all tests, inspections and approvals necessary for the Work.

SC-13.07.A. Modify the last sentence of paragraph A as follows:

- A. "...found to be defective, Contractor shall within 7 days of written notification from Owner; propose a solution back to Owner, and within 14 days implement the solution, without cost to Owner and in accordance with the Owner's written instructions."

SC-13.07.B. Modify the first sentence of paragraph B as follows:

- A. " If Contractor does not address the defective Work within the timelines established in 13.07.A and comply with the terms of Owner's written instructions, or in an emergency case where delay would cause serious risk, of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced."

SC-14.02.A.3. Replace 14.02.A.3 with:

"The amount of retainage with respect to progress payments shall be 5%."

SC-14.02.C.1 Amend the first sentence of Paragraph 14.02.C.1 to read as follows:

"Forty five days after presentation..."

~~**SC-14.07.A.2.d.** Delete Paragraph 14.07.A.2.d in its entirety.~~

SC-14.07.C.1. Revise the first sentence of Paragraph 14.07.C.1 as follows:

"Forty-five days after the presentation...."

SC-14.07.C.1. Add the following language at the end of Paragraph 14.07.C.1:

"Final payment shall not be made until the State Tax Commission issues and the Owner receives a tax release stating that all taxes have been paid."

END OF SECTION

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Section 4

IDEQ Idaho Drinking Water State Revolving Fund (DWSRF) Specifications Insert

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Form 6-A**Idaho Drinking Water State Revolving Fund (DWSRF)
Specifications Insert****A. GENERAL**

The requirements contained herein apply to **all** projects either partially or completely funded by the DWSRF Program. In the event of conflict with other requirements contained elsewhere, the requirements contained herein shall control.

All applicable federal, state, and local laws shall be complied with during bidding and construction. The contractor is responsible for its own and its employees' acts or omissions under the laws and the contract and are jointly and equally responsible for the acts and omissions of their employees.

Copies of all documentation required by this specification insert and in Chapter 6 of this Handbook shall be kept by the loan recipient, who shall maintain the records until three years of loan repayments will have occurred.

B. COMPLIANCE WITH STATE AND LOCAL LAWS

The construction of the project, including the letting of subcontracts in connection herewith, shall conform to the applicable requirements of state and local laws and ordinances to the extent that such requirements do not conflict with federal laws and regulations.

**C. MAINTENANCE OF EXISTING TREATMENT WORKS DURING
CONSTRUCTION**

Where construction consists of replacement or modification to any existing supply or distribution line, pumping facility or water treatment works, the contractor shall provide for the maintenance of the works' conveyance of water and its existing level of treatment at all times during construction, unless otherwise specified within these specifications.

D. ACCESS

The contractor shall provide for access to all sites of contract work for representatives of the Environmental Protection Agency (EPA) and the state Department of Environmental Quality (DEQ).

E. BONDING REQUIREMENTS

For construction or facility improvement contracts exceeding \$100,000, the minimum requirements shall be as follows:

1. Bid guarantee: a bid guarantee from each bidder equivalent to five percent of the bid price. The "bid guarantee" shall consist of a firm commitment such as a bid bond, certified check, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of his bid, execute such contractual documents as may be required within the time specified.
2. Performance bond: a performance bond on the part of the contractor for 100 percent of the contract price. A "performance bond" is one executed in connection with a contract to secure fulfillment of all the contractor's obligations under such contract.
3. Payment bond: a payment bond on the part of the contractor for 100 percent of the contract price. A "payment bond" is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided for in the contract.

F. INSURANCE

The contractor shall obtain such construction insurance (e.g., fire and extended coverage, workers' compensation, public liability, property damage, and "all risk" builder's risk) as is customary and appropriate unless identified more specifically elsewhere in these specifications.

G. SAFETY

Contractors are solely responsible for ensuring safety standards at the project site and for ensuring that all work will be conducted in a manner consistent with Occupational Safety and Health Administration Safety and Health Standards, 29 Code of Federal Regulations (CFR) Part 1926.

H. PROJECT SIGN

A sign may be produced and erected in a prominent location to adequately mark the project. (Signage costs are loan eligible.) The sign indicates that the project is funded by DEQ. Refer to Chapter 6 of the DWSRF Handbook for sign specifications.

I. MODEL CONTRACT CLAUSES

As appropriate, the borrower shall include the following Model Contract Clauses, or their equivalent, in each contract.

1. Supersession

The recipient and the contractor agree that this and the following clauses apply to that work eligible for DWSRF assistance to be performed under this contract and that these clauses supersede any conflicting provisions of this contract.

2. Privity Of Contract Clause

This contract is expected to be funded in part with funds from the EPA and DEQ. Neither the United States, the State of Idaho nor any of its departments, agencies, or employees is, or will be a party to this contract or any lower tier contract.

3. Audit Access to Records

- a) The contractor (the person or entity under contract with the loan recipient to perform the work partially or fully paid for with DWSRF) shall maintain books, records, documents, and other evidence directly pertinent to performance on DWSRF-funded work under this contract in accordance with generally accepted accounting principles and practices consistently applied, and the applicable DEQ regulations in effect on the date of execution of this contract. The contractor shall also maintain the financial information and data used in the preparation or support of any cost submission required under applicable regulations for negotiated contracts or change orders and a copy of the cost summary submitted to the recipient. The DEQ, the EPA, the Comptroller General of the United States, the United States Department of Labor, and the recipient, or any of their authorized representatives shall have access to all such books, records, documents, and other evidence for the purpose of inspection, audit, and copying during normal business hours. The contractor will provide proper facilities for such access and inspection.
- b) If this is a fixed price contract awarded through sealed bidding or otherwise on the basis of effective price competition, the contractor agrees to make paragraphs (a) through (g) of this clause applicable to all negotiated change orders and contract amendments affecting the contract price. In the case of all other types of prime contracts, the contractor agrees to make paragraphs (a) through (g) applicable to all contract awards in excess of \$10,000, at any tier, and to make paragraphs (a) through (g) of this clause applicable to all change orders directly related to project performance.
- c) Audits conducted under this provision shall be in accordance with generally accepted auditing standards and with established procedures and guidelines of the reviewing or audit agency.
- d) The contractor agrees to disclose all information and reports resulting from access to records under paragraphs (a) and (b) of this clause to any of the agencies referred to in paragraph (a).
- e) Records under paragraphs (a) and (b) above shall be maintained by the contractor during performance on DEQ assisted work under this contract and for three years after the recipient

makes final payment to the contractor and all other pending matters are closed.

- f) Access to records is not limited to the required retention periods. The authorized representatives designated in paragraph (a) of this clause shall have access to records at any reasonable time for as long as the records are maintained.
- g) This right of access clause applies to financial records pertaining to all contracts (except for fixed price contracts awarded through sealed bidding or otherwise on the basis of effective price competition), and all contract change orders regardless of the type of contract, and all contract amendments regardless of the type of contract. In addition, this right of access applies to all records pertaining to all contracts, contract change orders, and contract amendments:
 - (1) To the extent the records pertain directly to contract performance;
 - (2) If there is any indication that fraud, gross abuse, or corrupt practices may be involved; or
 - (3) If the contract is terminated for default or for convenience.

4. Covenant Against Contingent Fees

The contractor assures that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee excepting bona fide employees or bona fide established commercial or selling agencies maintained by the contractor for the purposes of securing business. For breach or violation of this assurance, the recipient shall have the right to annul this agreement without liability or, at its discretion, to deduct from the contract price or consideration, or otherwise recover the full amount of such commission, percentage, and brokerage or contingent fee.

5. Gratuities

- a) If the recipient finds after a notice and hearing that the contractor or any of the contractor's agents or representatives offered or gave gratuities (in the form of entertainment, gifts or otherwise) to any official, employee or agent of the recipient, DEQ or EPA in an attempt to secure a contract or favorable treatment in awarding, amending or making any determinations related to the performance of this contract, the recipient may, by written notice to the contractor, terminate this contract. The recipient may also pursue other rights and remedies that the law or this contract provides.
- b) In the event this contract is terminated as provided in paragraph (a), the recipient may pursue the same remedies against the contractor as it could pursue in the event of a breach of the contract by the contractor, and as a penalty, in addition to any other damages to which it may be entitled by law, be entitled to exemplary damages in an amount which shall be not less than three nor more than ten times the costs the contractor incurs in providing any such gratuities to any such officer or employee.

6. Contracts For Professional Services

The following clause applies only to contracts for services.

- a) The contractor is responsible for the professional quality, technical accuracy, timely completion, and coordination of all designs, drawings, specifications, reports and other services furnished by the contractor under this contract. If the contract involves environmental measurements or data generation, the contractor shall develop and implement quality assurance practices consisting of policies, procedures, specifications, standards and documentation sufficient to produce data of quality adequate to meet project objectives and to minimize loss of data due to unforeseen conditions or malfunctions. The contractor shall, without additional compensation, correct or revise any errors, omissions or other deficiencies in that contractor's designs, drawings, specifications, reports and other services.
- b) The contractor shall perform the professional services necessary to accomplish the work specified in this contract in accordance with this contract and applicable DEQ requirements in effect on the date of execution of the assistance agreement for this project.
- c) The owner's or DEQ's approval of drawings, designs, specifications, reports and incidental work or materials furnished shall not in any way relieve the contractor of responsibility for the technical adequacy of his work. Neither the owner's nor DEQ's review, approval, acceptance or payment for any of the services shall be construed as a waiver of any rights under this agreement or of any cause for action arising out of the performance of this contract.
- d) The contractor shall be, and shall remain, liable in accordance with applicable law for all damages to the owner or DEQ caused by the contractor's negligent performance of any of the services furnished under this contract, except for errors, omissions or other deficiencies to the extent attributable to the owner, owner-furnished data or third party. The contractor shall not be responsible for any time delays in the project caused by circumstances beyond the contractor's control.
- e) The contractor's obligations under this clause are in addition to the contractor's other express or implied assurances under this contract or state law and in no way diminish any other rights that the owner may have against the contractor for faulty materials, equipment or work.

7. Anti- Lobbying Act

The contractor agrees to comply with the requirements of the federal Anti-Lobbying Act, Section 1352, Title 31, U.S. Code, which requires disclosure of lobbying activities. The Certification Form, "*Certification of Compliance with Anti-Lobbying Act*", (Attachment B see Section P - Submissions), must be signed by all contractors entering into contracts of \$100,000 or greater. For further information refer to:

<https://www.govinfo.gov/app/details/USCODE-2010-title31/USCODE-2010-title31-subtitleII-chap13-subchapIII-sec1352/context>.

8. Compliance With Copeland Act Requirements

The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated in this contract by reference.

9. Subcontracts

The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

10. Contract Termination: Debarment

A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

11. Wage Rate Requirements Under The Consolidated And Further Continuing Appropriations Act, 2013 (P.L. 113-6): Required Davis-Bacon Contract Clauses:

- a) **Preamble:** With respect to the Clean Water and Safe Drinking Water State Revolving Funds, EPA provides capitalization grants to each State which in turn provides subgrants or loans to eligible entities within the State. These eligible entities are referred to as subrecipients.
- b) **Davis-Bacon Requirements For Subrecipients That *Are* Governmental Entities:**
Typically, the subrecipients are municipal or other local governmental entities that manage the funds. For these types of recipients, the provisions of the Davis Bacon (DB) requirements set forth in Section I shall apply --these DB requirements are accessible at <https://www2.deq.idaho.gov/admin/LEIA/api/document/download/15074> and shall be incorporated in all contracts and subcontracts as model contract clauses. The DB requirements are incorporated into this specification through reference. Although EPA and the State remain responsible for ensuring subrecipients' compliance with the wage rate requirements set forth therein, those subrecipients shall have the primary responsibility to maintain payroll records as described in Section II.3.
- c) **Davis-Bacon Requirements For Subrecipients That *Are Not* Governmental Entities:**
Occasionally, the subrecipient may be a not for profit entity. For these recipients, the provisions set forth in Section II of the DB requirements shall apply --these DB requirements are accessible at <https://www2.deq.idaho.gov/admin/LEIA/api/document/download/15074> and shall be incorporated in all contracts and subcontracts as model contract clauses. The applicable DB requirements are incorporated into this specification through reference. Although EPA and the State remain responsible for ensuring subrecipients' compliance with the wage rate requirements set forth herein, those subrecipients shall have the primary responsibility to maintain payroll records as described in Section II.3.
- d) **For Further Information:** If a subrecipient requires general guidance, or has questions

regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, may contact MaryAnna Peavey, Grants & Loans Bureau Chief, at MaryAnna.Peavey@deq.idaho.gov or at 208-373-0122. The subrecipient may also obtain additional guidance from U.S. Department of Labor's (DOL) web site at <http://www.dol.gov/whd/>

12. Required American Iron and Steel Contract Clause

- a) **Preamble:** In accordance with the current SRF Assistance AIS requirements, all of the iron and steel products used in the project shall be produced in the United States. This requires that all manufacturing processes, including application of coatings, must take place in the United States. The term "all manufacturing processes" includes processes such as melting, refining, forming, casting, rolling, drawing, finishing, fabricating and coating.

The term "iron and steel products" means products made of greater than 50% iron or steel measured by cost; the cost should be based on the material costs of the iron and steel products in the article (e.g., hydrants, valves). The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels. These products include, but are not limited to: lined or unlined pipes and fittings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, construction materials, manhole covers and other municipal castings.

- b) **Required AIS Construction Contract Clause:** In order to ensure compliance with the AIS requirement, the following AIS contract language is part of these specifications and the construction contract:

"The Contractor acknowledges to and for the benefit of the City/District of ("Purchaser") and the Idaho State Department of Environmental Quality, that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund that have statutory requirements commonly known as "American Iron and Steel;" that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part,

from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.”

13. Required Nondiscrimination Contract Clause

As required by 40 CFR 33, Appendix A, the following clause shall be included as part of these specifications and the construction contract:

“The contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR Part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.”

J. MISCELLANEOUS DAVIS BACON

1. It is important for the actual wage determination(s) to be physically included in the bid specifications/contract. Contractors need to see the minimum wages they will be required to pay while they develop their cost estimates for work to be performed.
2. As of July 2019, the website to locate current wage determinations is <http://beta.sam.gov/>
3. All contracts and subcontracts shall include the DB Model Contract Clause either Section I or Section II, as applicable, from:
<https://www2.deq.idaho.gov/admin/LEIA/api/document/download/15074> (verbatim, in their entirety).
4. The default wage category is "heavy." If another category of work is performed that exceeds 10% of the total project cost or exceeds \$1 million, then the project labor costs must use the additional wage category/ies (i.e., roads, buildings, residential). Additionally, the additional category/ies labor costs shall be supported with documentation.

K. MISCELLANEOUS AMERICAN IRON AND STEEL

1. **On-site Data Records:** The General Contractor shall develop and maintain an on-site materials compliance log containing current records of all iron and steel products arriving on the construction site. The log shall include the Purchase Order number and sufficient product information to enable tracking of the materials, such as product description, serial and lot numbers (if available), manufacturer's name, and origin of shipment including city and state. In addition, a separate log shall be maintained to track information related to de minimis materials such as Purchase Order number, product description, current value of de minimis materials, and the running percentage of de minimis product value received to the total cost of materials for the project.

2. Manifests: To ensure information is consistent and valid, the Contractor shall compare the information contained on the manifests accompanying iron and steel products, with previously submitted AIS Product Compliance Letters.
3. Bidder's Certification of Compliance: An executed Bidder's Certification of Compliance, (Form AIS-1, see Section P - Submissions), covering all proposed steel and iron products, shall be furnished by bidders as part of the sealed bid; this Certification is required in order to constitute a valid bid.
4. AIS Products - Manufacturer Letter Certifying Product Compliance: Subsequent to the issuance of the Notice of Award, but prior to payment, Manufacturer Product Letter(s) of Compliance, shall be furnished by the Prime Contractor ('the Contractor') to the Owner or Owner's representative for iron and steel products. The lack of the ability of the Contractor to furnish letters certifying compliance of iron and steel products with AIS requirements will be justification for rejection of the product(s), and any related cost increases this may cause will be borne by the Contractor. The product certification shall assert that all manufacturing processes occurred in the USA (Form AIS-2, see Section P - Submissions). A copy of certifications for specific AIS products shall be required prior to reimbursement from SRF loan funds for the products.
5. AIS Information: For information regarding waivers, and further AIS clarifications and definitions, refer to the Drinking Water Loan Handbook, Chapter 6: <https://www2.deq.idaho.gov/admin/LEIA/api/document/download/14610> and the EPA AIS website: http://water.epa.gov/grants_funding/aisrequirement.cfm. For any AIS related questions Jorge Medrano of the EPA may be contacted at (202) 564-1968 Medrano.Jorge@epa.gov. For assistance with reviewing manufacturer product certification letters contact SRF_AIS@epa.gov with "cert letter review" as the subject. For a list of AIS Best Management Practices contact the State SRF Loan program, AIS designee: Kevin McNeill P.E. at Kevin.McNeill@deq.idaho.gov, or phone: (208) 373-0452.

L. SUSPENDED AND DEBARRED

The contractor agrees to comply with Subpart C of 2 CFR Part 180 and 2 CFR Part 1532 (Suspension and Debarment). The contractor or subcontractor shall not knowingly enter into covered transactions (any contract awarded to a subcontractor, supplier, or consultant where the expected amount of the contract is \$25,000 or greater) with excluded persons.

1. General: Prohibition on Equipment Purchase from Excluded Contractors:
In addition, loan recipients and contractors shall check that certain prohibited equipment, systems, or services, including equipment, systems, or services are not produced or provided by entities identified and recorded in the System for Award Management exclusion list at: <https://www.sam.gov/SAM/pages/public/searchRecords/advancedPIRSearch.jsf>. Items included in the prohibition are not eligible SRF costs, and the SRF programs cannot reimburse borrowers or contractors for these costs.
2. Telecommunications and Surveillance Equipment: Loan recipients and contractors are prohibited from obligating or expending loan funds to procure equipment, services, or

systems that use telecommunications equipment or services produced by Huawei Technologies Company or ZTE Corporation. Recipients and contractors also may not use EPA funds to purchase: video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company. Recipients and contractors shall be mindful of automatic meter reading (AMR) technology and advanced metering infrastructure (AMI), instrumentation control systems (e.g. process control systems, distributed control systems and programmable logic controls), and security cameras and other electronic security measures to ensure that those items are procured from a non-excluded entity.

3. Condition For all Lower Tier Transactions: The contractor or subcontractor shall insert this condition into all lower tier covered transactions and ensure any subsequent lower tier covered transactions include this condition. Excluded parties may be verified at www.sam.gov.

M. BIDDER'S LIST

The successful bidder shall submit **Form 1. Bidder's List** (see Section P - Submissions) to the loan recipient who shall provide a copy to DEQ. The list shall provide specific contact information on the general contractor and all subcontractors including business name, contact, address, phone, email, date bid submitted; and shall outline the items of work for which they will be retained; and shall indicate if they are a Disadvantaged Business Enterprise (DBE). The completed form must be in-hand prior to DEQ issuance of the Authorization to Award.

N. EQUAL EMPLOYMENT OPPORTUNITY/AFFIRMATIVE ACTION (EEO/AA)

The EEO/AA requirements only apply to contractor who has (1) 50 or more employees and (2) signs a contract, subcontract, or purchase order amounting to \$50,000 or more.

1. Online Standard Form 100 (EEO-1): Successful bidders shall complete and submit the online form 100 to the Joint Reporting Committee within 30 days after the award of such a contract or purchase order, unless such person has submitted such a report within 12 months preceding the date of award. Subsequent reports shall be submitted annually on or before the 30th day of September. Failure to file timely, complete, and accurate reports as required constitutes non-compliance with contractors' or subcontractors' obligations under Executive Order 11246, as amended, and is grounds for the imposition of sanctions authorized by Executive Order 11246 and other rules and regulations issued pursuant thereto. Further information is available at: <https://egov.eeoc.gov/eeo1/>. The EEO-1 Form is available at: <http://www.eeoc.gov/employers/eeo1survey/2007instructions.cfm>.
2. The EEO Poster (EEOC-P/E-1): Successful bidders must post the EEO poster on site; the EEO poster may be ordered through the Equal Employment Opportunity Commission (EEOC) Website at: <http://www1.eeoc.gov/employers/poster.cfm>.
3. Contact the EEOC: It is the successful bidder's responsibility to contact the EEOC within 30 days of contract award. EEO Contact Information: EEO-1 Joint Reporting Committee P.O.

Box 19100, Wash. D.C. 20036-9100; phone (866) 286-6440; Email:
e1.techassistance@eeoc.gov.

O. DISADVANTAGED BUSINESS ENTERPRISE UTILIZATION

1. Policy

Consistent with the President's Policy Statement on Disadvantage Business Enterprises (DBEs) dated December 17, 1983, Executive Order 12432 and the Environmental Protection Agency's Procurement Under Assistance Agreements Regulation (40 CFR 33) dated May 28, 2008, all bidders shall be required to comply fully with these bid specifications toward the goal of equitable utilization of DBEs. DBEs consist of Minority Business Enterprises (MBE), Women Business Enterprises (WBE), and Small Business Enterprises (SBEs).

Such utilization may be through prime contracting, subcontracting, joint-venture, procurement of supplies, material or equipment, or other business participation utilized in performing this project. In this regard all contractors shall take all necessary and reasonable steps to ensure DBEs have the maximum opportunity to compete for and/or perform contracts. Contractors shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of EPA assisted projects.

2. Fair Share

Fair Share is a reasonable amount of funds commensurate with total project funding, demographic factors, and the availability of DBE businesses. A fair share does not constitute an absolute goal, but a commitment on the part of the bidder to attempt to use minority and women's businesses by carrying out the five "Good Faith Efforts" described under 40 CFR 33 Subpart C.

3. Requirements

Bidders must take the following "Good Faith Efforts" in awarding subcontracts for supplies, construction or services and equipment:

- a) Make DBEs aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and Local and Government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
- b) Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
- c) Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or

quantities to permit maximum participation by DBEs in the competitive process.

- d) Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
- e) Use the services and assistance of the Idaho Transportation Department, Idaho Department of Environmental Quality's Fiscal Office, the Small Business Administration, and the Office of Minority Business Enterprise of the U.S. Department of Commerce, as appropriate.
- f) If the prime contractor awards subcontracts, require the prime contractor to take the above steps.
- g) The successful bidder shall complete and submit a Sworn Statement of Compliance (Attachment A; see Section P - Submissions). The Loan Recipient shall forward a copy to DEQ prior to issuance of the Authorization to Award.

- h) For DBE questions, contact the SRF DBE Coordinator:

Charlie Parkins SRF DBE Coordinator,
Idaho Dept. Environmental Quality,
1410 N Hilton St., Boise Idaho 83706
Phone: (208) 373-0577
Charlie.Parkins@deq.idaho.gov

4. Recordkeeping

The loan recipient must maintain all records documenting its compliance with the DBE requirements of 40 CFR Part 33 (Subpart E: Recordkeeping and Reporting), including documentation of its, and its prime contractors, good faith efforts (Subpart C) and data relied upon in formulating its fair share objectives (Subpart D). Such records must be retained in accordance with applicable record retention requirements of the recipients financial assistance agreement.

P. SUBMISSIONS (Copies of Required Forms Follow this Section)

1. Form to be submitted by all bidders as part of the sealed bid:

FORM AIS-1 American Iron & Steel	Bidder's Certification of Compliance With American Iron and Steel (AIS) Provisions
-------------------------------------	--

2. Forms to be submitted by the Successful Bidder prior to issuance of the authorization to award:

Form 1. ATTACHMENT A	Bidder's List of Subcontractors Sworn Statement of Compliance with Disadvantaged Business Enterprise Utilization Requirements
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3. Forms to be submitted by the Loan Recipient to DEQ with requisitions for reimbursement:

FORM AIS-2
American Iron & Steel

Product Letter(s) of Compliance with American Iron and Steel
Provisions

4. Forms to be submitted by the Successful Bidder to the Loan Recipient prior to issuance of the notice to proceed:

ATTACHMENT B	Certification of Compliance with Anti-Lobbying Act (Anti-Lobbying Certification)
ATTACHMENT C	Disadvantaged Business Enterprises to be Utilized
ATTACHMENT D	Disadvantaged Business Enterprises Contacted
ATTACHMENT E	Contractor's Compliance Statement (Executive Order #11246)
ATTACHMENT F	Certification of Non-Segregated Facilities

To be submitted as part of the sealed bid; Recipient forwards a copy to DEQ

FORM AIS-1
Bidder's Certification of Compliance
With the Current SRF Assistance American Iron and Steel (AIS) Provisions

(To be submitted as part of the sealed bid)

Bidder's Statement of Certification

The Bidder acknowledges to and for the benefit of the ("Owner") for the ("Project") that the Bidder understands the project is being funded in part with SRF Assistance. "AIS" requirements specify that all iron and steel products used in the project shall be produced in the United States. Consistent with the terms of the Owner's bid solicitation and the provisions of SRF Assistance, the Bidder hereby represents and warrants to and for the benefit of the Owner that:

1. The Bidder has reviewed and understands the AIS requirements.
2. The Bidder certifies that the iron and steel goods used in the project will be produced in the United States in a manner that complies with the AIS requirements unless a waiver of the requirements is requested by the Owner and approved by the EPA.
3. The Bidder agrees to provide to the Owner reasonable, sufficient, and timely information, certification, or verification of the United States production of each component contained in Attachment 6 as a prior condition for approval of - and reimbursement for - materials received.
4. The undersigned hereby acknowledges that the iron and steel products utilized in this project will meet the current SRF Assistance AIS requirements, and that all required Manufacturer/Supplier Certification Statements or waivers from EPA will be obtained to document compliance with the AIS requirements.

Bidder Signature: _____ Date: _____

Title

Organization

To Be Submitted Prior to Authorization to Award; Recipient forwards a copy to DEQ

ATTACHMENT A

SWORN STATEMENT OF COMPLIANCE WITH DISADVANTAGED BUSINESS ENTERPRISE (DBE) UTILIZATION REQUIREMENTS

To be eligible for award of this contract, each successful bidder must execute, and submit, as part of their proposal, and together with their bid, the following certification relating to DBE participation. The certification below shall be deemed a part of the resulting contract.

The bidder has taken the following "Good Faith Efforts" in awarding subcontracts:

1. Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and Local Government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
2. Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
3. Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
4. Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
5. Use the services and assistance of the Idaho Transportation Department, Idaho Department of Environmental Quality's Fiscal Office, SBA and the Minority Business Development Agency of the Department of Commerce, as appropriate.
6. If the prime contractor awards subcontracts, require the prime contractor to take the above steps.

Signature _____

Date _____

Name and title of Signer

Email Address

Loan Recipient receives from the Successful Bidder, who approves and submits to DEQ as supporting documentation for Pay Requests

FORM AIS-2

(Must be Provided on Company Letterhead)

**Letter Certifying Compliance of Iron & Steel Products with
Current SRF Assistance American Iron and Steel (AIS) Provisions**

Date:

Company Name:

Address, City:

State, Zip:

Subject: **AIS Step Certification for Project** (name of project)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the AIS provisions as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXXX
2. XXXXX
3. XXXXX

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signature of Company Representative

Date

Loan Recipient Receives from the Successful Bidder Prior to issuing Notice to Proceed

ATTACHMENT B

Certification of Compliance with Anti-Lobbying Act

The undersigned certifies, to the best of his/her knowledge and belief that:

1. No federally appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federally funded grant, the making of any federally funded loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federally funded contract, grant, loan or cooperative agreement.
2. If any funds other than federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this federally funded contract, grant, loan or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying", in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Signature

Date

Loan Recipient Receives from the Successful Bidder Prior to issuing Notice to Proceed

Attachment C

Disadvantaged Business Enterprises to be Utilized

Project

Name of Bidder

MBE = minority business enterprise

WBE = women's business enterprise

SBE = small business enterprise

Name of firm

Address

City State Zip Code

Phone

Description of work element or supplies

Amount to be contracted

Name of firm

Address

City State Zip Code

Phone

Description of work element or supplies

Amount to be contracted

☐ MBE

☐ WBE

☐ SBE

☐ Joint Venture Percent:

☐ Other

☐ Subcontractor

☐ Supplier

☐ Manufacturer

☐ MBE

☐ WBE

☐ SBE

☐ Joint Venture Percent:

☐ Other

☐ Subcontractor

☐ Supplier

☐ Manufacturer

Name of firm

Address

City

State

Zip Code

Phone

Description of
work element
or suppliesAmount to be
contracted☐ MBE☐ WBE☐ SBE☐ Joint
Venture Percent: ☐ Other☐ Subcontractor☐ Supplier☐ Manufacturer

Contractor

Signature _____

Use additional pages if necessary.

Loan Recipient Receives from the Successful Bidder Prior to issuing Notice to Proceed

Attachment D Disadvantaged Business Enterprises Contacted

Project

Name of Bidder

MBE = minority business enterprise

WBE = women's business enterprise

SBE = small business enterprise

Name of firm

Address

City State Zip Code

Phone

Description of work element or supplies

Amount to be contracted, if utilized

Name of firm

Address

City State Zip Code

Phone

Description of work element or supplies

Amount to be contracted, if utilized

☐ MBE

☐ WBE

☐ SBE

☐ Joint Venture Percent:

☐ Other

☐ Subcontractor

☐ Supplier

☐ Manufacturer

☐ MBE

☐ WBE

☐ SBE

☐ Joint Venture Percent:

☐ Other

☐ Subcontractor

☐ Supplier

☐ Manufacturer

Name of firm

Address

City

State

Zip Code

Phone

Description of
work element
or suppliesAmount to be
contracted, if
utilized☐ MBE☐ WBE☐ SBE☐ Joint Venture Percent: ☐ Other☐ Subcontractor☐ Supplier☐ Manufacturer

Use additional pages if necessary.

Loan Recipient Receives from the Successful Bidder Prior to issuing Notice to Proceed

ATTACHMENT E

CONTRACTOR'S COMPLIANCE STATEMENT (EXECUTIVE ORDER #11246)

Date

This statement relates to a proposed contract with (name of grantee):

who expects to finance the contract with assistance from the Environmental Protection Agency. I am the undersigned bidder or prospective contractor. I represent that:

I have ☐ I have not ☐ participated in a previous contract or subcontract subject to Executive Order 11246 of September 24, 1965 (regarding equal employment opportunity) or a preceding similar Executive Order. I agree to comply with all the provisions of this Executive Order and the rules, regulations and relevant orders of the Secretary of Labor. (60-1.4(b)(4))

Signature _____ Date _____

Name and Title of Signer

Loan Recipient Receives from the Successful Bidder Prior to issuing Notice to Proceed

ATTACHMENT F

CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to federally assisted construction contracts and related subcontracts exceeding \$10,000 which are not exempt from the Equal Opportunity clause.)

The federally assisted construction contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor certified, further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract.

As used in this certification, the term "segregated facilities" means any waiting rooms, work area, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or area, in fact, segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed contractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such, certification in this file.

Signature

Date

Name and Title of Signer

Section 5 / 6

**Prevailing Wage (Davis Bacon)
Determination**

&

**City of Moscow Federally Funded
Projects Davis Bacon Labor Standards**

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CITY OF MOSCOW
GRANT AND SPECIAL FUNDED PROJECTS
DAVIS BACON LABOR STANDARDS REQUIREMENTS
Updated – August 2022

SUMMARY OF RESPONSIBILITIES

Labor Standards Compliance is an effort of all parties involved and prevention is the key to success with labor standards. Some basic objectives to protect worker's rights are:

A. Responsibilities of Grant Administrator:

1. Make sure proper, current wage decision and labor standards provisions are contained in the bid documents.
2. Attend the pre-bid meeting/tour to notify contract bidders of federal labor standards provisions.
3. Conduct 10-day wage check.
4. Verify eligibility of Contractor.
5. Participate in preconstruction conference.
6. Ensure submission of all appropriate documentation, including payroll authorized signature form, payroll overview, signed checklists, requests for Additional Classifications, and documentation of fringe benefit plans.
7. Ensure wage decisions and/or additional classifications and USDOL poster are posted on site.
8. Conduct on-site interviews with laborers and mechanics.
9. Review Certified Payrolls and compare to the employee interviews and wage decisions.
10. Notify Prime Contractor and subcontractors (as applicable) of payroll discrepancies.
11. Notify IDC Specialist of wage restitution found due, including the preparation and submission of Labor Standards Enforcement Reports.
12. Investigate probable violations and complaints of underpayment and submit Labor Standards Enforcement Reports as necessary.

B. Responsibilities of Prime Contractor:

1. Attend pre-construction conference.
2. Review and identify any Additional Classifications needed by all contractors and subcontractors for the project.
3. Read, understand, and sign all appropriate forms from the Grant Administrator, including but not limited to: contractor certification, certificate of substantial completion, pre-construction checklist, and payroll authorized signature form.
4. Comply, in a timely manner, with requests from Grant Administrator. Including documentation of fringe benefits, correction CPRs, and wage restitution.
5. Comply with all applicable requirements and reporting.
6. Include appropriate wage decisions and labor standards clauses in contracts with subcontractors.
7. Insertion of all applicable clauses in all contracts and subcontracts.
8. Ensure labor standards compliance from subcontractors.
9. Post wage decision, including additional wage classifications, at work site.

10. Collect certified payrolls from all subcontractors, if applicable.
11. Submit all certified payrolls to Grant Administrator weekly.
12. Ensure availability of the prime contractor and subcontractor's employees for interviews at the job site with the Grant Administrator or agency representative.

APPLICABLE LAW

- A. Davis-Bacon Act: The Davis-Bacon Act (DBA) requires the payment of prevailing wage rates (which are determined by the USDOL) to all workers. The law applies to construction, alterations or repair contracts in excess of \$2,000. Construction includes alterations and/or repair, including painting and decorating, of public buildings or public works. Those Davis-Bacon provisions contained in HUD assisted construction programs are known as "Related Acts" and will be referred to as DBRA in this chapter.
- B. Copeland "Anti-Kickback" Act: The Copeland Act requires employers to pay employees at least once a week, without any deductions or rebates except permissible deductions. The Copeland Act also requires every employer (contractor and subcontractor) maintain payroll records and to submit weekly payroll reports (CPRs). The Act applies to all contracts covered by Davis-Bacon. Violation of this Act is a criminal offense.
- C. Contract Work Hours and Safety Standards Act (CWHSSA): CWHSSA applies to contracts over \$100,000. CWHSSA requires workers to receive overtime (O/T) compensation at time and one-half pay for overtime hours (over 40 hours in any workweek) plus full fringe worked on the covered project $[(1 \text{ and } \frac{1}{2} \times \text{base pay}) + \text{fringe} = \text{O/T compensation}]$. CWHSSA violations render the contractor liable to the underpaid worker for wage restitution and the United States for liquidated damages penalty (\$10/calendar day per violation). Intentional violations of CWHSSA standards are considered a federal criminal misdemeanor.
- D. Fair Labor Standards Act (FLSA): The FLSA pertains to federal minimum wage rates, overtime pay, recordkeeping and child labor requirements. These requirements generally apply to any labor performed and may be pre-empted by other federal standards such as the DBRA prevailing wage requirements and CWHSSA overtime provisions. Only the USDOL has the authority to administer and enforce FLSA. HUD will refer to the USDOL any possible FLSA violations that are found on HUD projects.

EXEMPTIONS TO DAVIS-BACON AND RELATED ACTS (DBRA)

- A. Non-Covered Job Classifications: Workers performing the normal duties of the following job classifications are not subject to prevailing wage requirements of DBRA:
 1. Project engineer
 2. Project foreman (supervisory only), as distinguished from a working foreman (one who devotes more than twenty (20) percent of his/her time during a work week to mechanic or laborer duties, and who must be paid the applicable rate for the hours so worked).
 3. Watchman
 4. Clerical workers

- B. Volunteer Labor: A volunteer is an individual who performs services for a public or private entity for civic, charitable or humanitarian reasons without promise, expectations or receipt of compensation for services rendered. Individuals are considered to be volunteers only when their services are offered freely and without pressure and coercion, direct or implied, from an employer. Prison or correctional institution inmates can be considered volunteer workers if the institution's program meets certain parameters.

For a project that will have work done solely by volunteers alone or in which there is a mix of paid workers and volunteers, the grantee shall record the name and address of the project, the number of hours worked and the hourly rate for all work performed by volunteers.

Volunteer Liability Insurance: Volunteer participation on a project can include inherent risks and accidents may result in unforeseen injury. In order to protect the community and volunteers, volunteer liability insurance is a solution.

- C. Force Account: The U. S. Department of Labor has taken the position that prevailing wage requirements do not apply to employees of a state or political subdivision of a state. In some instances, rather than contracting or subcontracting out construction work, a grant recipient performs the construction in-house, with its own "force account" employees. Such force account work is not subject to the prevailing wage requirements of DBRA. Furthermore, the USDOL does not consider a state or local government to be a contractor, even if it enters into a contract to perform construction work (see 29 CFR Section 5.2(h)).
- D. Cleaning: Cleaning performed during construction is subject to prevailing wage provisions. In the absence of a specific wage rate for the cleaning classification, the cleaners must be paid the predetermined wage rate for laborers. Cleaning performed after the completion of construction to prepare the premises for occupancy that is not done under the construction contract is not subject to the prevailing wage requirements.
- E. Demolition: Demolition not related to construction is not subject to the prevailing wage requirements of DBRA. For example, the demolition of a building because the structure is no longer needed would not be a covered construction activity. However, where an existing building is being demolished as a phase of a construction project subject to the prevailing wage requirements of DBRA, the demolition would also be covered, as in the case of demolition performed to permit construction of a new building.
- F. Utility Employees: Employees of utilities are exempt provided they are only extending existing service to the property.
- G. Precutting of Parts and Prefabrication of Assemblies: The precutting of parts and/or the prefabrication of assemblies are not subject to the prevailing wage requirements of DBRA unless conducted in connection with and at the site of the project or in a temporary plant set up elsewhere to supply the needs of the project and dedicated exclusively or nearly so, to performance of the contract or project.
- H. Supply and Installation Contracts: The manufacturer or furnisher of materials, supplies or equipment is not subject to prevailing wages unless conducted in connection with and at the site of the project or set up elsewhere to meet the needs of the project. If a supply contract, not otherwise covered, requires the supplier to install the product, the installation portion of

the contract is subject to prevailing wage requirements of DBRA. There is an exception if the installation involves an incidental amount of construction activity. It is not subject to prevailing wage requirements in this instance. Contracts for the supply and installation of window shades, venetian blinds, traverse rods, and draperies involve only an incidental amount of construction activity, and therefore are not subject to prevailing wage decisions. The installation of a lagoon liner or a pre-fabricated park bathroom is an example of work subject to prevailing wage rates. Questions concerning the coverage of installation activity should be referred to the Grants Administrator.

- I. Railroad Employees: Employees of railroads operating under collective bargaining agreements that are subject to the Railway Labor Act are not subject to DBRA. However, any workers performing construction work on the railroad under a contract are subject to DBRA.

LABOR STANDARDS ADMINISTRATION: PRE-BID PHASE

A construction project covered by federal labor standards requires a series of specific actions by Grant Administrators prior to awarding a construction contract. Refer to the list in the Summary of Responsibilities.

Bidding Documents

The contract for construction is the vehicle to ensure contractor compliance and Davis-Bacon wage enforcement. Therefore, the bidding documents for each project subject to Davis-Bacon wage rates must contain both a Davis-Bacon wage decision and federal labor standards clauses. It is the responsibility of the Grant Administrator to obtain the most current Davis-Bacon wage decision and provide it and the labor standards clauses to the project architect or engineer to ensure that these documents are included in the bidding documents.

The Grant Administrator must review the bidding documents using the Bid Document Review Certification form and certify they contain the correct Davis-Bacon wage decision, General Conditions and Federal Labor Standards Provisions.

- A. Davis-Bacon Wage Decision (Wage Determination): Each construction contract subject to federal Davis-Bacon labor standards requirements must contain a Davis-Bacon wage decision. The Davis-Bacon wage decision is a listing of wage rates and fringe benefits for each classification of laborers and mechanics determined to be prevailing in a given area (usually a county) for a particular type of construction.

The USDOL has distinguished four general types of construction: Heavy Construction, Highway Construction, Building Construction and Residential Construction. The Grant Administrator is responsible for obtaining the proper wage decision. One can be obtained from the following web address: <https://sam.gov/content/home>. Davis Bacon projects require wage decisions to be updated to ensure that the most current and correct wage decision is being used. The Grant Administrator is responsible for obtaining and documenting that the wage decision is updated 10 days prior to bid opening.

Failure to include the required wage decision and appropriate labor standards provisions in bidding documents will not relieve the city or county from potential liabilities for enforcement

actions. It is the prime contractor's responsibility to ensure inclusion of wage rates and labor standards provisions in all subcontracts. Any failure to include a wage decision must be rectified.

- B. Updating Wage Decisions: There are specified times that wage decisions must be updated for different procurements. In all cases, wage decisions must be updated to ensure that the proper and correct wage rate is used for the project.

1. Competitive Sealed Bidding

Most construction contracts fall under the competitive sealed bid procurement process. This procurement process includes wage decisions in the bid documents and has a bid opening date. These projects require a Wage Decisions check to be completed no more than ten (10) days prior to bid opening. If the 10-day check falls on a weekend, the wage rate must be checked the Monday following the 10-day check. If the 10-day check falls on a holiday, the wage rate must be checked the day after the 10-day timeline.

Pre-Bid Meeting

During the pre-bid meeting, the federal labor requirements and wage decision should be reviewed with the contractors. This is the time to determine if all work classification(s) needed for the job are on the wage decision. If the work classification(s) needed do not appear on the wage decision, then an additional classification and wage will be needed. Additional classifications are typically approved after the construction contract is awarded.

LABOR STANDARDS ADMINISTRATION: POST-BID PHASE

The post-bid requirements consist of evaluating and tabulating each of the bidder's responses, verifying contractor eligibility, notifying contractor of award, holding a preconstruction conference (including additional classification requests), and obtaining all appropriate certifications.

Evaluation and Tabulation of bidders

After opening all sealed competitive bids, the grantee evaluates, prepares bid tabulation form and identifies the successful bidder. A successful bidder is the lowest responsive and responsible bidder.

Verification of Contractor Eligibility (Federal Debarred List)

All contractors must be eligible to work on federally assisted contracts. By the insertion of certification of eligibility clauses in all contracts and subcontracts, the prime contractor and all subcontractors state they are eligible for award of federally assisted or insured contracts. The Grant Administrator shall verify that all prime contractors are eligible before contract award by requesting verification.

Prime contractors shall be informed in preconstruction conferences that it is their responsibility to employ only eligible subcontractors. All subcontractors must certify eligibility in written contracts containing federal labor standards provisions.

Notice of Award

The contract must be awarded within 90 days of bid opening. If the contract has not been awarded within ninety (90) days after bid opening, *the Wage Decision must be updated*. To document this, send the new completed Wage Rate Update form to the Grant Administrator.

Preconstruction Conference

The preconstruction conference should address all questions related to the labor standards provisions posed by contractors and subcontractors and also applicable federal labor standards provisions. The preconstruction conference is to make certain that the contractor understands its responsibility for all federal labor standards provisions and Davis-Bacon compliance. The grantee, Grant Administrator and design professional shall hold a conference with the prime contractor and all subcontractors before the start of construction. At this time the contractor will be advised of the overall management of the project including the labor standards provisions.

A Preconstruction Conference Checklist has been prepared as a tool to review project management considerations. Give each contractor and subcontractor on the job a copy of the preconstruction conference packet. Submit the Preconstruction Conference Checklist to the Grant Administrator no more than five (5) days following the date of the conference.

Implementation of Federal Labor Standards

- A. **Apprentices:** The only workers who can be paid less than the wage rate on the wage decision for their work classification are “apprentices” and “trainees” registered in approved apprenticeship or training programs, including Step-Up apprenticeship programs designed for Davis-Bacon construction work. Approved programs are those which have been registered with the U.S. Department of Labor (USDOL), Bureau of Apprenticeship and Training (BAT) or with a BAT-recognized State Apprenticeship Agency (SAC). **Note: Apprentices registered in a state or local (Idaho) sponsored program must also be registered with the USDOL, Bureau of Apprenticeship and Training. The Grant Administrator is responsible for verifying whether the program is registered in the sponsor database. The link to the database can be found here: <http://oa.doleta.gov/bat.cfm>.**

Apprentices and trainees are paid wage rates in accordance with the wage schedule in the approved program plus the full fringe amount.

1. “Probationary apprentice” can be paid as an apprentice if the BAT has certified that the person is eligible for probationary employment as an apprentice.
2. The allowable ratio of apprentices and trainees to journeymen in any classification shall not be greater than the ratio permitted under the registered program. Apprentices or trainees employed at the job site in excess of the allowable ratio on a day to day basis shall be paid the wage rate contained in the wage decision for the classification of work actually performed.
3. Any worker listed on a payroll at an apprentice or trainee wage rate, who is not registered with or in a program approved by USDOL/BAT, shall be paid the Davis-Bacon wage rate for the classification of work actually performed.

4. The contractor or subcontractor will be required to furnish to the labor standards compliance person written evidence of the registration of his/her employees in a USDOL approved program.

- B. Truck Drivers: Truck drivers employed by a construction contractor or construction subcontractor are not covered by the prevailing wage requirements of the Davis-Bacon Act while engaged in transporting materials or supplies to or from the site work. Truck drivers whose time spent on the site of work that is considered de minimis, such as only a few minutes at a time to pick up or drop off materials or supplies, are also exempt from the Davis-Bacon Act. Davis-Bacon would apply to them only for their time employed “directly upon the site of the work.” Davis-Bacon Act coverage will apply to truck drivers while hauling between the project site and any special facilities established exclusively for the project (29 CFR 5.2 (7)(2)).
- C. Working Subcontractors/Owner Operators: A working subcontractor/owner operator is a contractor who owns the business and performs the work himself and has no employees. All working subcontractors/owner operators need to be reported on the certified payrolls of whoever hired them. If they are the prime contractor, the grantee is responsible for signing and submitting payrolls. Their name, employee identification number (if applicable), work classification, contract amount and “self-employed” designation must all be included on the certified payroll.

Contractors working on the project with their employees shall be listed on the payroll. They must list their name, work classification including “owner” and the daily and total hours worked. They do not need to list their rate of pay or amount earned.

- D. Relatives: There are no exceptions made in the enforcement of DBRA on the basis of family relationship for relatives who are performing the work of laborers or mechanics. They must be paid the prevailing wage rate for the classification of work performed and be included on the certified payrolls.
- E. Certified Payroll Reports (CPRs): Each contractor, subcontractor, and lower-tier subcontractor, shall submit to the Grant Administrator, Certified Payroll Reports for each work week from the time work is started on the project until it is completed. Payrolls shall be numbered sequentially and the last payroll marked “final.” If work is not performed on the project during a given work week, a payroll does not need to be submitted if the contractor numbers his payrolls sequentially and notifies the Grant Administrator he will not be working on the project for a specified period of time. Otherwise, the contractor should submit “No Work” payrolls when there is a temporary break in work on the project. Contractors are required to pay workers every week. They cannot put two weeks of work on one payroll. Payrolls shall be completed and submitted no later than seven (7) workdays following completion of the workweek.

The prime contractor is responsible for full compliance with regard to his/her own workforce and with regard to the compliance of every subcontractor. For this reason, all CPRs and any related records are submitted to the Grant Administrator through the prime contractor. Payrolls and related records shall be maintained during the course of the construction work and preserved by the contractor and the subcontractor for at least four (4) years.

- F. Certified Payroll Reports Format (Form WH-347): Certified Payroll Reports information may be submitted in any form, provided that the Grant Administrator can reasonably interpret the information to monitor employer compliance with the labor standards and all required information is included on the form. Contractors are encouraged to use USDOL Payroll Form WH-347. The weekly payrolls are called certified because each payroll is signed and contains language certifying that the information reported on the payroll is true. The payroll certification language is on the reverse side of the WH-347. If the contractor uses another type of payroll format, he may attach the certification from the back of the WH-347. Even though a contractor may use an appropriate payroll form of his own choice, he must report all required items of information and submit a copy of the weekly Statement of Compliance or a form containing the identical wording contained in Form WH-347. Only one Statement of Compliance is required for each weekly payroll no matter how many pages are needed to report the employee data.
- G. Inspection of Records and On-Site Interviews: Each contractor shall make the required records (CPRs and related documents) available for inspection, copying or transcription by authorized representatives of the City of Moscow or IDEQ. In addition, each employer shall permit authorized representatives to interview employees during working hours on the job site.
- Failure by any contractor to submit the required records or to make them available, or to permit on-site employee interviews may, after written notice to the contractor, cause a suspension of any further payment, advance or guarantee of funds. In addition, failure to submit the records on request or to make them available may be grounds for debarment action.
- H. Proper Designation of Trade: The classification of each employee must be selected from the wage decision or an approved Additional Classification based on the actual type of work performed. Each worker must be paid no less than the wage rate on the wage decision for that classification regardless of his or her level of skill. In other words, if someone is performing carpentry work on the project, they must be paid no less than the wage rate on the wage decision for Carpenters, even if they are not considered by the contractor to be fully trained as a Carpenter. The only people who can be paid less than the rate for their craft are apprentices registered with the USDOL, Bureau of Apprenticeship and Training.
- I. Additional Classifications: If it is found that a wage decision does not contain some of the classifications needed for the project, notify the Grant Administrator. If there is not a suitable classification on the existing wage decision, then an additional classification will be requested. The rate of pay for the additional classification cannot be below the unskilled labor wage rate on the wage decision. Rates for additional laborers, truck drivers and power equipment operators should be compared with other laborers, truck drivers and power equipment operators respectively. Requested rates should be comparable to similar occupations listed in similar classifications. The Additional Classification Request form will be completed by the Grant Administrator and sent to IDEQ along with a copy of the project wage decision. IDEQ will forward the additional classification request to the USDOL for approval and forward their determination to the Grant Administrator.

COMPLIANCE MONITORING AND ENFORCEMENT

There are several important aspects of effective labor standards compliance. Preventive measures which can be undertaken prior to the start of construction reduce the commission of violations after construction begins. However, misunderstandings can still occur. Monitoring identifies possible misunderstandings on the part of the employers, discrepancies in the record, and violations. The two key aspects of routine monitoring include regular reviews of project CPRs and on-site interviews with laborers employed on the project. This routine monitoring is performed by the Grant Administrator to ensure the compliance of all contractors with the applicable labor standards provisions. Written monitoring reports to the principal contractor advise the contractor of the status of compliance, provide clarification where misunderstanding may exist, and advise the contractor of any additional submissions which may be required to correct discrepancies or to complete the record. Contractors are permitted thirty (30) days to provide missing documentation, and correct any discrepancies or violations, including any underpayments of wages.

Weekly Payroll Reviews

The Grant Administrator shall insist upon prompt submission of all payrolls no later than seven (7) work days following completion of the workweek. The Grant Administrator shall withhold funds from the contractor if excessively delinquent in the submission of payrolls. The payrolls shall be examined upon receipt so any necessary corrective action may be initiated before the problem multiplies, and may be accomplished while the workers are still available. Special attention should be given to each project by the Grant Administrator during the early stages of construction to determine whether the principal contractor is meeting his responsibilities regarding payrolls. Spot-checking of payrolls is permissible after the initial review of four to five weeks of payrolls indicates no significant problems. Initial CPR review parameters and corrective actions required of the contractor shall include the following aspects:

- A. Payroll Format: Contractors are urged to use Payroll Form WH-347 which accounts for all required information and includes the “Statement of Compliance” (the certified part of the payroll) on its reverse side. Employers may utilize any other appropriate payroll form provided that it contains all of the required information and is accompanied by a statement containing the identical wording on the form WH-347.
- B. Foreman: If a foreman is listed on the payroll with no other classification, it must be determined if he is a working foreman on a project. A project foreman is distinguished from a working foreman.
 - 1. Project Foreman: This job is supervisory in nature. He can spend up to twenty (20) percent of his time performing mechanic or laborer duties and will be exempt from Davis-Bacon wages. He does not need to be listed on the payroll.
 - 2. Working Foreman: This job is one that devotes more than twenty (20) percent of the time during a workweek to mechanic or laborer duties. This foreman must be paid the Davis-Bacon rate for all the hours worked. The classification would be the one that he performs the mechanic or laborer duties in.
- C. Split Classification(s) This term refers to employees performing work in more than one classification during the same workweek. The employee must be paid the Davis-Bacon rate for

actual hours spent in each classification, provided the work performed is capable of separation into more than one classification, and provided time records are kept in accordance with actual hours spent in each classification.

- D. Hours Worked, Pay Rates, and Gross Wages Earned: The daily and total hours worked for the week per employee per classification must be shown. List actual hourly rate paid to the employee for straight time worked plus any cash fringes paid to the employee. The basic hourly rate and fringe rate cannot be less than the applicable wage decision in the approved contract specifications. The payroll should only show the regular and overtime hours worked on the Davis-Bacon covered project. If an employee performs work at job sites other than the project for which the payroll is prepared, those “other job” hours should not be reported on the payroll. For employees with earnings on other projects, gross wages for the project for which the payroll is prepared can be shown over gross earnings for “all projects” (for example, \$425.40/\$764.85). Deductions and net pay are based on the “all projects” earnings.

Corrections: Contractors must submit a supplemental Certified Payroll Report or other written documentation reflecting daily and total hours worked for the week per employee as well as the fringe benefit contribution. If underpayments have occurred, the contractor shall be required to make restitution.

- E. Overtime Hours Worked: Overtime hours shall be compensated at not less than one and one-half (1 and 1/2) times the regular rate of basic pay plus the straight-time rate of any required fringe benefits for anything over a 40-hour work week. Weekly hours shall be reviewed to determine whether overtime hours were worked and properly compensated. Be especially careful when reviewing split classifications because sometimes hours between classifications are not totaled and overtime can be missed.

Corrections: Where CWHSSA overtime violations occur (contracts over \$100,000), the contractor shall be required to pay restitution to the affected employees and shall be notified of liability for liquidated damages. Only overtime hours worked on the covered project are subject to CWHSSA compensation. Where the project is not subject to CWHSSA, the employer will be notified of possible FLSA overtime violations.

- F. Fringe Benefits: Where fringe benefits are included on the wage decision or where the employer seeks credit for fringe benefit payments, the employer shall certify as to the payment of fringe benefits on the *Statement of Compliance* (reverse of WH-347) by marking either 4(a), that fringe benefits are paid to approved funds, plans or programs, or 4(b) that fringe benefits are paid in cash, and note any exceptions under 4(c). A fringe benefits program includes health insurance, retirement, life insurance, and some contributions to training funds (See page 12 for more information about Fringe Benefits). Fringe benefits do not include employer payments or contributions required by other federal, state or local laws, such as the employer’s contribution to Social Security or some disability insurance payments.

Corrections: Contractors shall be required to submit corrected CPRs where the CPR does not indicate how the employer met any fringe benefit obligation contained in the wage decision. If fringe benefits are contained in the wage decision and the contractor does not participate in a bona fide fringe benefit program, the employer shall pay the cash equivalent of the required fringe benefit directly to the employees

with the basic rate of pay. (Note: Fringe is paid for overtime worked, but not computed in the time and one half for overtime pay.) Where underpayments have occurred, the contractor shall be required to make restitution to the affected employees.

- G. Deductions Made and Actual Net Wages Paid: All deductions shall be identified and reviewed for any non-permissible deductions. Permissible deductions that **do not require** written authorization from the employee include deductions made in compliance with requirements of federal, state or local law, (e.g. taxes, social security, deductions required by court processes – including Child Support withholdings, etc.). **Any voluntary deduction** (savings account, loan repayment, employee contribution to health insurance, wage advance, pensions, life or accident insurance, and retirement plans) **must be authorized in writing by the employee** (see Employee Voluntary Deduction Authorization Form). The Voluntary Deduction Authorization Form signed by the employee is all that is needed and should accompany the first payroll on which the deduction appears. Deductions for tools are permissible only when the employee provides written authorization and it is a benefit to the employee. An excerpt from 29 CFR 3 provides additional information of permissible deductions. Other deductions are not allowable without prior approval from the U.S. Department of Labor.
- H. Authorized Signature: The statement of compliance must be signed (original signature) by a principal of the firm (owner or officer such as the president or treasurer) or by an authorized agent (a person authorized by a principal in writing to sign the payroll reports). The signature authorization must be submitted with the first payroll.

Fringe Benefits

If fringe benefits are paid into a plan, the following criterion applies and documentation should be submitted to the Grant Administrator for review at the preconstruction conference (prior to the first payroll):

- A. A contractor may credit contributions for bona fide fringe benefits. Bona fide benefits are those common to the construction industry and are paid into a fund, plan or program on the employee's behalf. Contractors may take credit for contributions made under such conventional plans without requesting approval of the Grant Administrator. These plans are funded plans. See "G" below for examples and guidelines.
- B. Contributions to funded plans must be made irrevocable and paid at least quarterly to a third-party trust.
- C. When the per hour contribution for benefits paid into a plan do not equal the total rate set forth in the wage decision, the difference must be paid to the employee in cash.
- D. Fringe benefits must be paid for straight time and overtime; however, fringe benefits are not included when computing the overtime rate.
- E. Employees excluded from funded plans must be paid fringe benefits in cash.

- F. Vacation and sick leave plans are generally unfunded, paid from the contractor's own account, and require Grant Administrator approval before a contractor takes credit toward meeting the fringe benefit obligation.
- G. The fringe may be shown as $\$4.15 + 3 \frac{1}{2}\%$. The $3 \frac{1}{2}\%$ is computed on the base rate, then added back to the fringe. For example, base rate is $\$21.68$ and fringe rate is $\$4.15 + 3 \frac{1}{2}\%$. Multiply the base rate by the percent fringe ($\$21.68 \times .035 = .76$). Add the amount computed to the fringe ($\$4.15 + .76 = \4.91). Total fringe required is $\$4.91$. For apprentices, the percentage base rate is used to calculate the fringe.

The following method is an example on how to determine if the amount contributed to the plan equals the amount required to be paid for fringe benefits per the appropriate Davis-Bacon Wage Decision.

METHOD: In determining the cash equivalent credit for fringe benefit payments, take the total amount that would be paid into the funded plan for a year and divide by 2080 hours.

EXAMPLE: Contractor pays $\$100/\text{month}$ to a funded health insurance plan. Davis-Bacon Wage Rates require $\$4/\text{hour}$ paid for fringe benefits.

FORMULA: $(\$100 \times 12)$ divided by 2080 = .57 cents as the cash equivalent.

RESULT: The contractor must pay $\$3.43$ to the employee in cash for fringe benefits and the remaining .57 cents to the funded plan. The contractor must note on the back of the payroll under (4)(a-c) how fringe benefits are paid and provide documentation for the funded plan as listed below.

Adequacy of fringe benefits will be determined by the Grant Administrator based upon a review of the following information that you are requested to submit:

1. Description of the coverage that you provide those employees and the name, address and phone number of the third-party trustee.
2. Signed authorization of those employees to accept those specific employer-paid contribution amounts considered bona fide fringe benefits.
3. The providers proof of payment into the plan, fund or program (i.e., monthly billing statement).

This adequacy is applicable for one (1) year from the date of review and applies to HUD funded projects.

Note: All contractors, based in Idaho and those based out of the state, that are doing work in Idaho are required to pay Idaho Unemployment Insurance. However, this amount does not count toward the required Davis-Bacon Fringe Benefit.

The above requested information must be submitted to: Grants Manager, City of Moscow, P O Box 9203, Moscow ID 83843.

Falsification of Certified Payroll Reports

Contractors who willfully violate the labor standards provisions may falsify Certified Payroll Reports to conceal the violations. Willfully violating contractor's Certified Payroll Reports often contain indicators that permit a Grant Administrator to determine whether they were falsified. Where falsification is suspected, it may be appropriate to send questionnaires to the employees to gather more information to determine the nature and extent of any violations. In order to resolve violations involving falsified Certified Payroll Reports, it is often necessary to conduct an investigation to determine the true work and wage payment activity and to "reconstruct" the payroll.

Common indicators of falsification and willful violations follow:

- A. Ratio of Laborers to Mechanics: Except for concrete, landscaping and similar contractors, the ratio of laborers to mechanics should not exceed 1 to 1. A higher ratio of laborers normally indicates misclassification. In other words, laborers are performing some or all of mechanic's work. The false information may be limited to the classification of work.
- B. Too Few or Irregular Hours: Most workers are employed on a regular forty (40) hour per week basis. CPRs that consistently reflect less than forty (40) hours per week for all or certain groups of employees or that reflect erratic work schedules (e.g., the crew works only a few hours per day scattered throughout the work week), indicate that the hours may have been reduced to give the appearance of compliance. The falsification in these cases may be limited to the hours worked.
- C. Discrepancies in Wage Computations: CPRs that reflect frequent discrepancies in wage computations, e.g., even gross wage payments (\$400/week) computed from an uneven hourly wage rate (\$15.67/hour), indicate that the employees may be working on a piece rate basis or at an even (\$10/hour) wage rate. Here, the falsification may involve the hours worked or the rate of pay, or both.
- D. Extraordinary Deductions: Unexplained or unusually high deductions may indicate that the employee is being required to kickback a portion of their earnings. While this would indicate willful violations, it does not necessarily indicate falsification. The information on the CPR may otherwise be accurate.

On-Site Inspection

Maintaining compliance during the course of construction will save time, trouble, and expense to the contractor and grantee involved. Grant Administrators are encouraged to time their initial on-site monitoring within the first three (3) weeks of construction to assure all postings are displayed and conduct on-site interviews to identify potential problems as early as possible. The following on-site activities are required:

- A. Posting: The Grant Administrator must ensure the wage decision any additional classifications and other required materials are posted by the contractor at the work site in a prominent and accessible place where the workers can easily read them. The Federal Labor Poster that informs employees of their rights and indicates complaints will be received by the Grant Administrator shall also be conspicuously displayed.

- B. Employee Interviews: Every attempt shall be made to conduct on-site employee interviews with the workers on the job site. The purpose of the interviews is to capture observations of the work being performed and to get the workers' views on the hours they work, the type of work they perform and the wages they receive. Information gathered during the interview is recorded on the Record of Employee Interview form. The Record of Employee Interview form is compared to the corresponding contractor and subcontractors certified payrolls to test and verify the accuracy of the payroll information. If on-site interviews cannot be conducted, then mail interviews must be conducted.

Grant Administrators will make every attempt to interview up to ten (10) percent of the workers in all trades. At a minimum, these interviews would include at least one (1) person in each trade and each classification for each contractor. However, Grant Administrators are encouraged to target interviews to projects and/or groups of workers where violations are suspected or alleged. In this way, on-site interviews can be used to support a specific on-going investigation.

1. Place of Interview. Employees currently employed may be interviewed during working hours on the job, provided the interview can be properly and privately conducted on the premises. In cases of possible falsification of records, fear of reprisals or intimidation, it may be more advisable to conduct the interview elsewhere.
2. Initiating the Interview. The interviewer shall begin the interview by identifying themselves to the worker. They must confirm their identity by showing the worker credentials and explain the project is being constructed with assistance from the federal government, the payment of prevailing wages on construction projects with federal assistance is required by law, and the purpose of the interview is to obtain information for use in determining whether the required wages are being paid. Inform the employee that the information given during the interview is confidential and that their identity will only be disclosed with prior written consent of the employee.
3. Interview Time. If the interview is conducted on the job site, it shall be arranged causing the least inconvenience to the employer and employee.

Note: Interviews with non-English speaking workers will be conducted by a bi-lingual interviewer or with the assistance of a third-party interpreter. At no time shall the employer or other employees be used for interpretive services.

- C. Record of Employee Interview: A Record of Employee Interview has been prepared as a convenient format for recording interviews. Once the corresponding certified payroll reports are received, the information on the Record of Employee Interview must be compared to the payroll reports. Any discrepancies noted between Record of Employee Interview information and that on the payroll report need to be noted in Remarks. If discrepancies are noted, follow-up actions to resolve the discrepancies must be taken.

LABOR STANDARDS FREQUENTLY ASKED QUESTIONS

1. What wage rate would a contractor pay their employee while traveling to and from a job site?

Contractors are not bound by any Davis-Bacon regulations concerning the compensation of their employees during their travel time. However, the Fair Labor Standards Act mandates the payment of at least minimum wage to employees during travel time.

2. Should a contractor pay an employee overtime for driving to and from work on top of their forty-hour work week?

No, the employee clock starts at the job site, therefore, the hours traveled to and from work do not count against the forty-hour work week, but the employee must be compensated according to the Fair Labor Standards Act. See number one.

3. If a contractor pays an employee his/her hourly rate for their travel time to and from a job site, could this be considered a fringe benefit?

Yes. As long as it is a written statement included in the company policy.

4. If a contractor works on multiple projects, should they include all labor hours on the certified payroll?

For example, if a contractor is working on a grant-funded City project and is also working on a project for someone else in another location that is NOT a City project, the contractor does not have to report any of the hours worked on the other project. He is only required to report the City project hours. However, the contractor is required to report the gross wages earned on all projects followed by the gross wages earned on the City project. The contractor can do this on the payroll itself. This is our way of finding out whether or not a contractor is paying overtime.

5. Are apprentices entitled to fringe benefits, or are they only entitled an hourly rate based on a journeyman's hourly rate?

Apprentices that are registered with a USDOL Approved Apprenticeship Program are entitled to a percentage of the journeyman wage rate plus full fringe benefits.

6. Can a contractor require an employee to work during a week where there is a paid holiday? Would the holiday pay be considered in the regular forty-hour week or would the employee have to work the forty regular hours and get paid holiday hours as overtime?

Employees must work a forty-hour work week before they are entitled to overtime. In the case above, the contractor can ask his/her employees to work up to a forty-hour work week before paying them overtime wages. However, the contractor must compensate employees for the holiday pay.

7. Do Davis-Bacon regulations have to be enforced if a "Surveyor and Surveyor Helper" classifications are working on a street improvement project?

Surveyors are “service” oriented and thus exempt from Davis-Bacon wages. If you see a Surveyor on any payrolls you are reviewing, don’t worry about the Davis-Bacon implication. However, if you find a “service” orientated classification on any payroll, review only, do not make the judgment yourself, contact the Grants Administrator for clarification.

8. If a well drilling company is either testing or drilling exploratory wells, do Davis-Bacon wage rates apply?

No. This is considered a service. However, when a drilling company drills a well in order to put it into service or production, then Davis-Bacon wage rates come into play and apply to the drilling rig operators.

9. Does the televising of lines fall under Davis-Bacon?

No, the video recording of lines is exempt from Davis-Bacon as it is considered a service.

10. Is the use of a company truck for personal use considered a fringe benefit to an employee?

No. It is not considered a fringe benefit. The use of the truck is considered as payment for travel expenses and is incurred for the employer’s benefit.

11. If a contractor subs out to a subcontractor who has 4-5 contracted laborers how should the subcontractor account for the hours and wage rates?

Consider the contract laborers as subs, as long as they are being paid according to an agreement and, for this situation, it is OK for the subcontractor carrying the contract laborers on his payroll. Have each of the subcontractors listed on the payroll, just like an owner/operator does.

12. Does an employee who worked 38 hours during a week and who took 8 hours of vacation earn overtime pay to the week?

No, the employee must have worked over 40 hours during a week in order to earn overtime pay regardless of the vacation time taken during the week.

13. Are per diem and lodging expense payments to employees working out of town considered fringe benefits?

No, these expenses are part of doing business for the employer. If the employee was not working out of town the payments would not be paid to the employee, therefore, they are not considered fringe benefits but are a cost of doing business.

14. What is NOT considered a bona fide fringe benefit?

The Davis-Bacon Act excludes fringe benefits which a contractor or subcontractor is obligated to provide under other Federal, State or Local law. For example, payment for workman’s compensation insurance under either a compulsory or elective State Statute is not considered payments for fringe benefits. While each situation must be separately considered on its own

merits, payments made for travel, subsistence or to industry promotion funds are not normally payments for fringe benefits under the Act.

Supplemental General Conditions

These Supplemental General Conditions are to be part of a grant or special funded construction project for the City of Moscow.

Preconstruction Conference

After the contract(s) have been awarded but before the start of construction, a conference will be held for the purpose of discussing requirements on such matters as project supervision, progress schedule and reports, payrolls, payment to contractors, contract change order, insurance, safety and other items pertinent to the project. The contractor shall arrange to have all subcontractors and supervisory personnel connected with the project on hand to meet with representatives of the engineer and owner to discuss any problems anticipated.

Reports and Information

The contractor, at such times and in such forms as the owner may require, shall furnish the owner such periodic reports as requested pertaining to the work or services undertaken pursuant to this contract, the costs and obligations incurred or to be incurred in connection therewith, and any other matters covered by this contract.

Conflict of Interest

No member, officer, or employees of the grantee, or its designees or agents, no members of the grantee's governing body and no other public official of the grantee who exercises any functions or responsibilities with respect to this contract during his/her tenure or for one (1) year thereafter, shall have any interest, direct or indirect, in work to be performed in connection with this contract. All contractors shall incorporate, or cause to be incorporated, in all subcontracts, a provision prohibiting such interest.

Minority Business Enterprise

1. Include any such qualified firms on solicitation lists.
2. Assure that such firms are solicited whenever they are potential sources.
3. When economically feasible, divide total requirements into small tasks or quantities so as to permit such firms maximum participation.
4. Where possible, establish delivery schedules which will encourage such participation.
5. Use the services and assistance of the Small Business Administration, Idaho Transportation Department's Disadvantage Business Enterprise Program, and other sources when appropriate. (24 CFR Part 85.36(e)(vi)).

Public Works Licensing of Contractors

Prior to the award of the contract, bidders shall possess or obtain a license issued in the state of Idaho by the Idaho Public Works Contractors License Board in the class and type specified for the value and scope of work to be done in accordance with the provision of Title 54, Chapter 19, Idaho Code, as amended. Subcontractors undertaking to perform any work covered by the contract must also possess or obtain a license prior to award of the contract. Any construction project with an estimated cost of less than fifty thousand dollars (\$50,000) is exempt from the licensing requirement.

Standard Environmental Mitigation Measures

1. The construction contractors must comply with the Rules for the Control of Air Pollution in Idaho, IDAPA 58.01.01.651, by implementing precautions to prevent particulate matter from becoming airborne.
2. If any items of suspected historical or archaeological value are uncovered during construction, the contractor will be required to stop work and contact a City representative as soon as possible.
3. The collection and disposal of storm and surface water runoff from the project site must comply with the Idaho Department of Environmental Quality's (DEQ) Catalog of Storm Water Best Management Practices for design of all storm water treatment and disposal systems.
4. The contractor shall comply with the provisions of the Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharge from Construction Activities and the Construction Storm Water Pollution Prevention Plan (SWPPP).
5. If during the construction of the project, an underground storage tank, buried drum, other container, contaminated soil, or debris not scheduled for removal under the contract are discovered, the Contractor shall immediately notify the Engineer or other City representative. No attempt shall be made to excavate, open, or remove such material without written approval.

Clean Air and Water Act

For all contracts and subcontracts exceeding \$100,000, the contractor and all subcontractors shall comply with the requirements of the Clean Air Act, as amended, 42 USC 1857 et seq., the Federal Water Pollution Control Act, as amended, 33 USC 1368 et seq., and the regulations of the Environmental Protection Agency with respect thereto, at 40 CFR 15, as amended.

1. Any building, facility or site listed on the EPA List of Violating Facilities as of this contract may not be used in the performance of this contract.
2. The contractor will comply with all the requirements of Section 114 of the Air Act and Section 308 of the Water Act relating to inspection, monitoring, entry, reports and information, as well as other requirements specified in Sections 114 and 308 of the respective Acts, and all regulations and guidelines issued thereunder.

3. Prior to signing this contract, the contractor shall notify the grantee of any communication from EPA indicating that a facility to be used in the performance of this contract is under consideration to be listed on the EPA List of Violating Facilities.

Insurance During Construction

The contractor shall have in effect without interruption from the date of construction commencement until final payment is made and the Project is closed-out pursuant to the terms of this Contract, the following types of insurance. Further, the contractor warrants such insurance coverage shall be written on an "occurrence" basis and will be obtained with the following minimum liability limits:

1. Workers' Compensation Insurance and Employer's Liability Insurance:

- | | |
|---------------------------|----------------------------------|
| (1) State: | Statutory Limits |
| (2) Employer's Liability: | \$100,000 per accident |
| | \$500,000 Disease, Policy Limit |
| | \$100,000 Disease, Each Employee |

2. Comprehensive or Commercial General Liability Insurance which shall be endorsed to name the CITY OF MOSCOW. It shall include premises operation, owners and contractor's protective liability, products and completed operations liability, personal injury liability including employee acts, broad form property damage liability and blanket contractual liability, with no exclusion for explosion (X), collapse (C) and underground (U) hazards:

- | |
|---|
| (1) \$1,000,000 Each Occurrence |
| (2) \$1,000,000 Personal Injury |
| (3) \$2,000,000 Products/Completed Operations to be maintained for one (1) year following final payment |
| (4) \$2,000,000 General Aggregate |

3. Automobile Liability Insurance which shall be endorsed to name the CITY OF MOSCOW as an additional insured. It shall include for bodily injury and property damage: \$1,000,000 Combined Single Limit

Property or Builder's Risk Insurance

If required by the owner, the contractor shall have in effect Property or Builder's Risk Insurance. The Property or Builder's Risk Insurance shall include coverage for all direct physical loss, also known as "Special Causes of Loss" in an amount equal to one-hundred percent (100%) of the estimated maximum value of the Project upon completion with the broadest form of "all risk" coverage possible.

Certification of Non-Segregated Facilities

For contracts in excess of \$10,000, the contractor certifies that he/she does not maintain or provide for his/her employees any segregated facility at any of his/her establishments, and that he/she does not permit employees to perform their services at any location, under his/her control, where segregated facilities are maintained. He/she certifies further that he/she will not maintain or

provide for employees any segregated facilities at any of his/her establishments, and he/she will not permit employees to perform their services at any location under his/her control where segregated facilities are maintained.

The bidder, offeror, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause of this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, *transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. She/he further agrees that (except where she/he has obtained identical certifications from proposed subcontractors for specific time periods) she/he will obtain identical certification from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause; that she/he will forward the following notice to such proposed subcontractors (except where proposed subcontractors have submitted identical certifications for specific time periods). *Parking lots, drinking fountains, recreation or entertainment areas.

Data, Patent, and Copyright

The contractor shall hold and save the owner and its officers, agents, servants and employees harmless from liability of any nature or kind, including cost and expenses for, or on account of, any patented or unpatented invention, process, article or appliance manufactured or used in the performance of the contract, including its use by the owner, unless otherwise specifically stipulated in the contract documents.

Access to Records

The grantee, the federal grantor agency, the Comptroller General of the United States, the City of Moscow, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the contractor which are directly pertinent to this specific contract, for the purpose of making audit, examination, excerpts, and transcriptions. All required records must be maintained by the contractor for three (3) years after grantee makes final payments and all other pending matters are closed. (24 CFR Part 85.36(i) (10))

Architectural Barrier Act

Any building designed, constructed or altered must be made accessible to persons with disabilities. Exceptions include (1) alterations where access cannot be provided, i.e. roofs, heating systems, water and sewer systems; (2) alterations are not structurally feasible; or (3) where Uniform Federal Accessibility Standards (UFAS) or Americans with Disabilities Act (ADA) requirements cannot be met according to undue hardship criteria. (42 USC 4151 et seq., 24 CFR Part 40 (UFAS), 24 CFR Part 8)

Lead Based Paint

For all residential new construction or rehabilitation, use of lead-based paint on any interior surface, whether accessible or inaccessible, and exterior surfaces readily accessible to children under seven (7) years of age is prohibited. *The surfaces of all existing structures must be inspected.*

If lead based paint is found on any interior surfaces or accessible surfaces, it must be treated and repainted with two (2) coats of non-lead paint; or completely removed; or covered with a suitable material such as gypsum wallboard, plywood or plaster. (42 USC 4801 et seq., 24 CFR Part 35)

Davis-Bacon and Related Acts

See Federal Labor Standards Provisions HUD Form 4010 within this document.

Copeland “Anti-Kickback” Act

See Federal Labor Standards Provisions HUD Form 4010 within this document.

Contract Work Hours and Safety Standards Act, Sections 103 and 107

See Federal Labor Standards Provisions HUD Form 4010 within this document.

Executive Order 11246: Equal Employment Opportunity

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during their employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: *employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship*. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.
3. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers’ representatives of the contractor’s commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
5. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
6. In the event of the contractor’s noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or part and the contractor may be declared ineligible for

further government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

7. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States.
8. The contractor agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.
9. The contractor further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive order. In addition, the contractor agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the contractor under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such contractor; and refer the case to the Department of Justice for appropriate legal proceedings.

A. APPLICABILITY

The Project or Program to which the construction work covered by this Contract pertains is being assisted by the United States of America, and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

(1) MINIMUM WAGES

- (i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment, computed at rates not less than those contained in the wage determination of the Secretary of Labor (which is attached hereto and made a part hereof), regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH1321)) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place, where it can be easily seen by the workers.

(ii) Additional Classifications.

- (A) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:
- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination;
 - (2) The classification is utilized in the area by the construction industry; and
 - (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (B) If the contractor, the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division ("Administrator"), Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget ("OMB") under OMB control number 1235-0023.)
- (C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, or HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1235-0023.)

- (D) The wage rate (including fringe benefits, where appropriate) determined pursuant to subparagraphs (1)(ii)(B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this Contract from the first day on which work is performed in the classification.
- (iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
- (iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1235-0023.)
- (2) **Withholding.** HUD or its designee shall, upon its own action or upon written request of an authorized representative of the U.S. Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Department of Labor shall make such disbursements in the case of direct Davis-Bacon Act contracts.
- (3) **Payrolls and basic records.**
- (i) **Maintaining Payroll Records.** Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification(s), hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid.
- Whenever the Secretary of Labor has found, under 29 CFR 5.5(a)(1)(iv), that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.
- Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1235-0023 and 1215-0018)
- (ii) **Certified Payroll Reports.**
- (A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead, the payrolls only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <https://www.dol.gov/agencies/whd/forms> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the U.S. Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1235-0008.)

- (B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
 - (1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;
 - (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;
 - (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract; and
- (C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph (a)(3)(ii)(b).
- (D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.

- (iii) The contractor or subcontractor shall make the records required under subparagraph (a)(3)(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the U.S. Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and Trainees.

- (i) **Apprentices.** Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency (where appropriate), to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program.

If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed, unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (iii) **Equal employment opportunity.** The utilization of apprentices, trainees, and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.
- (5) **Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this Contract.
- (6) **Subcontracts.** The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs (1) through (11) in this paragraph (a) and such other clauses as HUD or its designee may, by appropriate instructions, require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.
- (7) **Contract termination; debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
- (8) **Compliance with Davis-Bacon and Related Act Requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this Contract.
- (9) **Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.
- (10) **Certification of Eligibility.**
- (i) By entering into this Contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(3) **Withholding for unpaid wages and liquidated damages.** HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety. The provisions of this paragraph C are applicable where the amount of the prime contract exceeds \$100,000.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96). 40 USC 3701 et seq.

(3) The contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

DAVIS BACON WAGE DECISION

The following Davis Bacon Wage Decision(s) apply to all labor activities performed on this project and are included in this Specification document:

**CITY OF MOSCOW
IDEQ STATE RFL-DW-1406F
BOOSTER STATION REPLACEMENT – PHASE II REBID
MOSCOW, IDAHO**

General Decision Number: ID20220015 07/29/2022

Superseded General Decision Number: ID20220015

State: Idaho

Construction Type: Building

Counties: Latah County in Idaho

General Decision Number: ID20220065 07/15/2022

Superseded General Decision Number: ID20210065

State: Idaho

Construction Type: Heavy

Counties: Benewah, Clearwater, and Latah Counties in Idaho

General Decision Number: ID20220082 02/25/2022

Superseded General Decision Number: ID20210082

State: Idaho

Construction Type: Highway

Counties: Latah County in Idaho

Superseded General Decision Number: ID20210015

State: Idaho

Construction Type: Building

County: Latah County in Idaho.

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$15.00 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2022.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Modification Number	Publication Date
0	01/07/2022
1	02/25/2022
2	03/11/2022
3	07/29/2022

BOIL0242-001 01/01/2021

	Rates	Fringes
BOILERMAKER.....	\$ 39.46	30.59

BRID0003-001 06/01/2019

	Rates	Fringes
BRICKLAYER.....	\$ 32.05	18.27

CARP0001-042 06/01/2021

	Rates	Fringes
CARPENTER (Includes Form Work and Scaffold Building, Excludes Acoustical Ceiling Installation and Drywall Hanging)).....	\$ 33.41	17.84

ELEV0019-006 01/01/2020

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 55.86	34.765

IRON0014-003 07/05/2021

	Rates	Fringes
IRONWORKER, REINFORCING AND STRUCTURAL.....	\$ 35.55	30.14

LAB00238-011 06/01/2019

	Rates	Fringes
LABORER (Common or General).....	\$ 27.94	13.00

Zone Differential (Add to Zone 1 rates): Zone 2 - \$2.00

BASE POINTS: Spokane, Pasco, Lewiston

Zone 1: 0-45 radius miles from the main post office.

Zone 2: 45 radius miles and over from the main post office

LAB00238-012 06/01/2018

	Rates	Fringes
LABORER (MASON TENDER (Cement/Concrete, Brick (Hod))...	\$ 26.84	12.35

PLAS0072-002 06/01/2021

ZONE 1:

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 32.44	19.56

Zone Differential (Add to Zone 1 rate): Zone 2 - \$2.00

BASE POINTS: Spokane, Pasco, Lewiston, Wenatchee

Zone 1: 0-45 radius miles from the main post office

Zone 2: Over 45 radius miles from the main post office

PLUM0044-005 06/01/2019

	Rates	Fringes
PLUMBER		
Zone 1.....	\$ 39.96	19.24

* ROOF0189-002 07/01/2022

	Rates	Fringes
ROOFER.....	\$ 31.53	13.26

SHEE0055-002 06/01/2019

	Rates	Fringes
SHEET METAL WORKER (Includes HVAC Duct Installation).....	\$ 32.31	22.06

SUID2010-008 08/08/2012

	Rates	Fringes
CARPENTER (Acoustical Ceiling Installation, and Drywall Hanging Only).....	\$ 24.69	1.62
DRYWALL FINISHER/TAPER.....	\$ 20.27	3.50
ELECTRICIAN.....	\$ 26.12	5.89
INSULATOR - MECHANICAL (Duct, Pipe & Mechanical System Insulation).....	\$ 20.17	1.79
LABORER: Carpenter Tender.....	\$ 17.71	1.82
OPERATOR: Backhoe/Excavator.....	\$ 20.75	4.42
OPERATOR: Crane.....	\$ 27.29	10.53
PAINTER: Brush, Roller and Spray.....	\$ 19.31	4.41
TRUCK DRIVER: Dump Truck.....	\$ 17.82	2.18

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave
for Federal Contractors applies to all contracts subject to the
Davis-Bacon Act for which the contract is awarded (and any
solicitation was issued) on or after January 1, 2017. If this

contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which

these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.

Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"

Superseded General Decision Number: ID20210082

State: Idaho

Construction Type: Highway

County: Latah County in Idaho.

HIGHWAY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$15.00 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2022.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Modification Number	Publication Date
0	01/07/2022
1	02/25/2022

ZONE 1:

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 32.44	19.56

Zone Differential (Add to Zone 1 rate): Zone 2 - \$2.00

BASE POINTS: Spokane, Pasco, Lewiston, Wenatchee

Zone 1: 0-45 radius miles from the main post office

Zone 2: Over 45 radius miles from the main post office

SUID2013-010 06/17/2013

	Rates	Fringes
CARPENTER (Form Work Only).....	\$ 26.57	8.10
ELECTRICIAN.....	\$ 26.83	11.94
HIGHWAY/PARKING LOT STRIPING: Painter.....	\$ 23.80	6.67
LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor.....	\$ 22.86	9.40
LABORER: Common or General.....	\$ 22.92	10.01
LABORER: Concrete Saw (Hand Held/Walk Behind).....	\$ 23.98	11.05
LABORER: Grade Checker.....	\$ 23.41	10.78
LABORER: Mason Tender - Cement/Concrete.....	\$ 23.52	10.39
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 25.97	10.95
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 25.35	11.55
OPERATOR: Broom/Sweeper.....	\$ 26.82	11.55
OPERATOR: Bulldozer.....	\$ 25.73	11.51
OPERATOR: Crane.....	\$ 27.18	10.97
OPERATOR: Crusher.....	\$ 25.06	9.23
OPERATOR: Grader/Blade.....	\$ 26.00	10.30
OPERATOR: Hydroseeder.....	\$ 24.76	11.51
OPERATOR: Loader.....	\$ 25.76	10.31
OPERATOR: Mechanic.....	\$ 26.00	9.93
OPERATOR: Oiler.....	\$ 25.66	9.23

OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 25.66	11.03
OPERATOR: Roller (Subgrade).....	\$ 22.24	8.57
OPERATOR: Roller.....	\$ 25.49	11.55
OPERATOR: Rotomill.....	\$ 29.78	4.52
OPERATOR: Screed.....	\$ 25.71	11.55
TRAFFIC CONTROL: Flagger.....	\$ 21.46	10.12
TRAFFIC CONTROL: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper.....	\$ 22.66	10.90
TRUCK DRIVER: Dump Truck.....	\$ 23.40	10.75
TRUCK DRIVER: Lowboy Truck.....	\$ 22.12	13.20
TRUCK DRIVER: Oil Distributor Truck.....	\$ 22.54	12.35
TRUCK DRIVER: Water Truck.....	\$ 23.12	10.75

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage

determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

Superseded General Decision Number: ID20210065

State: Idaho

Construction Type: Heavy

HEAVY CONSTRUCTION, Including water and sewer line construction and heavy construction projects on treatment plants and industrial (power plants, manufacturing plants, processing plants, etc.) sites

Counties: Benewah, Clearwater and Latah Counties in Idaho.

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$15.00 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2022.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Modification Number	Publication Date
0	01/07/2022
1	02/18/2022
2	02/25/2022
3	03/11/2022
4	07/15/2022

CARP0001-045 06/01/2021

	Rates	Fringes
CARPENTER (Form Work Only).....	\$ 38.87	17.84

* ELEC0073-011 07/01/2022

	Rates	Fringes
ELECTRICIAN.....	\$ 41.30	20.09

ENGI0370-035 06/01/2018

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		
Backhoe (45,000 gw & under), Cranes (25 tons & under), Drill (8 in bit and over)		
GROUP 5.....	\$ 28.76	15.95
Backhoe (45,000-110,000 gw), Crane (25-45 tons), Bulldozer (D-6 and over), Grader/Blade, Front-End Loader(4-8 yds), Paver, Scrapers (all)		
GROUP 6.....	\$ 29.04	15.95
Backhoe (over 110,000 gw), Cranes (45-85 tons), Heavy Duty Mechanic, Front End Loader (8-10 yds)		
GROUP 7.....	\$ 29.31	15.95
Bulldozer (up to D-6)		
GROUP 3.....	\$ 28.44	15.95
Cranes (85 tons & over), Front End Loader (10 yds & over)		
GROUP 8.....	\$ 30.41	15.95
Front End Loader (under 4 yds)		
GROUP 4.....	\$ 28.60	15.95
Rollers (all)		
GROUP 1.....	\$ 27.51	15.95

ZONE PAY:

ZONE CENTERS: SPOKANE, PASCO, LEWISTON

ZONE 1: 0-45 Miles: Free

ZONE 2: 45 Miles & Over: \$2.00

BOOM PAY (ALL CRANES):

(A): 180'-250': \$.50 over scale

(B): over 250': \$.80 over scale

IRON0014-006 07/01/2020

	Rates	Fringes
IRONWORKER, REINFORCING AND STRUCTURAL.....	\$ 30.10	34.59

LABO0238-028 06/01/2017

	Rates	Fringes
LABORER (PIPELINE ONLY) COMMON.....	\$ 26.28	12.15

LABO0238-031 07/01/2019

	Rates	Fringes
LABORER Asphalt Includes Raker, Shoveler, Spreader, and Distributor Group 4.....	\$ 28.48	13.00
Flagger Group 1A.....	\$ 25.84	13.00

Zone Differential (Add to Zone 1 rates): Zone 2 - \$2.00

BASE POINTS: Spokane

Zone 1: 0-45 radius miles from the main post office.
Zone 2: 45 radius miles and over from the main post office

PLAS0072-003 06/01/2021

BENEWAH, BONNER, BOUNDARY, CLEARWATER, IDAHO (NORTH OF THE 46TH
PARALLEL), KOOTENAI, LATAH, LEWIS AND NEZ PERCE AND SHOSHONE
COUNTIES

ZONE 1:

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 32.44	19.56

Zone Differential (Add to Zone 1 rate): Zone 2 - \$2.00

BASE POINTS: Spokane, Pasco, Lewiston, Wenatchee

Zone 1: 0-45 radius miles from the main post office
Zone 2: Over 45 radius miles from the main post office

PLUM0044-015 06/01/2019

	Rates	Fringes
PLUMBER Zone 1.....	\$ 37.71	23.44

TEAM0690-002 06/01/2020

	Rates	Fringes
TRUCK DRIVER (DUMP)		
6 yds and under.....	\$ 28.79	18.15
over 6 yds.....	\$ 29.23	18.15

SUID2010-058 08/08/2012

	Rates	Fringes
CARPENTER, Excludes Form Work....	\$ 29.92	5.20
LABORER: Common or General.....	\$ 23.75	8.98
LABORER: Landscape.....	\$ 22.13	11.13
LABORER: Pipelayer.....	\$ 17.67	7.26
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 20.97	0.00
OPERATOR: Concrete Batch Plant.....	\$ 24.94	11.96
OPERATOR: Forklift.....	\$ 21.20	0.00
TRUCK DRIVER: Lowboy Truck.....	\$ 21.00	12.10
TRUCK DRIVER: Water Truck.....	\$ 24.48	11.67

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

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Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

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A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

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Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"

POST THIS ON JOB SITE WITH WAGE DECISION(S)

EMPLOYEE RIGHTS UNDER THE DAVIS-BACON ACT

FOR LABORERS AND MECHANICS EMPLOYED ON FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION PROJECTS

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

**PREVAILING
WAGES**

You must be paid not less than the wage rate listed in the Davis-Bacon Wage Decision posted with this Notice for the work you perform.

OVERTIME

You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 40 in a work week. There are few exceptions.

ENFORCEMENT

Contract payments can be withheld to ensure workers receive wages and overtime pay due, and liquidated damages may apply if overtime pay requirements are not met. Davis-Bacon contract clauses allow contract termination and debarment of contractors from future federal contracts for up to three years. A contractor who falsifies certified payroll records or induces wage kickbacks may be subject to civil or criminal prosecution, fines and/or imprisonment.

APPRENTICES

Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.

PROPER PAY

If you do not receive proper pay, or require further information on the applicable wages, contact the Contracting Officer listed below:

or contact the U.S. Department of Labor's Wage and Hour Division.



For additional information:

1-866-4-USWAGE
(1-866-487-9243) TTY: 1-877-889-5627



WWW.WAGEHOUR.DOL.GOV

U.S. Department of Labor | Employment Standards Administration | Wage and Hour Division

WH 1321 (Revised April 2009)

DERECHOS DEL EMPLEADO

BAJO LA LEY DAVIS-BACON

PARA OBREROS Y MECÁNICOS EMPLEADOS EN PROYECTOS DE CONSTRUCCIÓN FEDERAL O CON ASISTENCIA FEDERAL

LA SECCIÓN DE HORAS Y SUELDOS DEL DEPARTAMENTO DE TRABAJO DE EEUU

**SALARIOS
PREVALECIENTES**

No se le puede pagar menos de la tasa de pago indicada en la Decisión de Salarios Davis-Bacon fijada con este Aviso para el trabajo que Ud. desempeña.

SOBRETIEEMPO

Se le ha de pagar no menos de tiempo y medio de su tasa básica de pago por todas las horas trabajadas en exceso de 40 en una semana laboral. Existen pocas excepciones.

CUMPLIMIENTO

Se pueden retener pagos por contratos para asegurarse que los obreros reciban los salarios y el pago de sobretiempo debidos, y se podría aplicar daños y perjuicios si no se cumple con las exigencias del pago de sobretiempo. Las cláusulas contractuales de Davis-Bacon permiten la terminación y exclusión de contratistas para efectuar futuros contratos federales hasta tres años. El contratista que falsifique los registros certificados de las nóminas de pago o induzca devoluciones de salarios puede ser sujeto a procesamiento civil o criminal, multas y/o encarcelamiento.

APRENDICES

Las tasas de aprendices sólo se aplican a aprendices correctamente inscritos bajo programas federales o estatales aprobados.

**PAGO
APROPIADO**

Si Ud. no recibe el pago apropiado, o precisa de información adicional sobre los salarios aplicables, póngase en contacto con el Contratista Oficial que aparece abajo:

o póngase en contacto con la Sección de Horas y Sueldos del Departamento de Trabajo de EEUU.



Para obtener información adicional:

1-866-4-USWAGE
(1-866-487-9243) TTY: 1-877-889-5627



WWW.WAGEHOUR.DOL.GOV

U.S. Department of Labor | Employment Standards Administration | Wage and Hour Division

WH 1321 SPA (Revised April 2009)

**CITY OF MOSCOW
IDEQ STATE RFL-DW-1406F
BOOSTER STATION REPLACEMENT – PHASE II REBID
MOSCOW, IDAHO**

See pages 49 through 56 for examples of how to complete payroll forms.

HOW TO COMPLETE PAYROLL FORMS (Front Section)

For Subcontractors only:

Enter IRS number on first payroll.

Check correct box.

U.S. DEPARTMENT OF LABOR
Wage and Hour Division

PAYROLL

OMB No.: 1235-0008
Expires 04/30/2018

NAME OF CONTRACTOR ☒ OR SUBCONTRACTOR ☐ ABC Construction		ADDRESS Moscow, Idaho	
PAYROLL NO. 12 Final	FOR WEEK ENDING July 9, 2019	PROJECT AND LOCATION City of Moscow	PROJECT OR CONTRACT NO.

Payrolls must be numbers sequentially.
Write the work "Final" after the number on you last payroll.

Enter days of week work was performed.

RATE OF PAY (Column 6) ▼▼▼

- Straight Time: Include fringe amount ONLY IF YOU PAY ALL OR PART IN CASH. (See back of payroll if you pay fringe amount to plan, fund or program.)
- Overtime: is calculated at (1 ½ x base) + fringe. Include fringe amount in this column ONLY IF YOU PAY ALL OR PART IN CASH. (See back of payroll if fringe amount paid to plan, etc.) ▼▼

Specify

- Type of deduction
- Total deduction withheld

(1) NAME AND IDENTIFICATION NUMBER OF EMPLOYEE	NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	OT. OR ST.	(4) DAY AND DATE							(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS						(9) NET WAGES PAID FOR WEEK
				S	M	T	W	T	F	S				FICA	WITH- HOLDING TAX	State Tax	Medi- cal	OTHER	TOTAL DEDUCTIONS	
				10	11	12	13	14	15	16										
				HOURS WORKED EACH DAY																
Carson Wentz #1256	1	Electrician	O						10	10	15.00	555.00	42.00	36.24	4.50	2.60	1.31	86.67	464.33	
			S		10	10	10	10		40	10.00									

Identification # required:

- The first time the workers name appears on the payroll.

Fill in the classification EXACTLY as it appears on the determination.

If classification is for a power equipment operator, indicate type, size, horsepower

OVERTIME

- Hours on this project contracted exceeding 40 per week.

STRAIGHT TIME

- Hours worked on this contract up to 40/wk

Enter gross, each deduction and net. Check your figures. Subtract the total amounts withheld from the total gross. The result should equal the total in Column 9.

HOW TO REPORT:* **Apprentice Wages*** **Overtime involving contract work hours and safety standards act when employee works on multiple federal projects.**

U.S. DEPARTMENT OF LABOR

PAYROLL

OMB No.: 1215-0008

Expires 04/30/2018

Wage and Hour Division

NAME OF CONTRACTOR ☒ OR SUBCONTRACTOR ☐										ADDRESS										
ABC Construction										Moscow, Idaho										
PAYROLL NO. 11					FOR WEEK ENDING July 9, 2019					PROJECT AND LOCATION City of Moscow					PROJECT OR CONTRACT NO.					
(1) NAME AND IDENTIFICATION NUMBER OF EMPLOYEE	NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	OT. OR ST.	(4) DAY AND DATE							(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS						(9) NET WAGES PAID FOR WEEK
				S	M	T	W	T	F	S				FICA	WITH- HOLDING TAX	Health	IRA	OTHER (Union Dues)	TOTAL DEDUCTIONS	
				3	4	5	6	7	8	9										
Allen Robinson	1	Apprentice Carpenter 1 st 6 mo. 40%	O										107.04	7.69	12.60	2.62	1.31	1.26	25.47	117.32
			S		4			8	8		20	5.35								
			O																	
			S																	
Mitchell Trubisky	2	Carpenter	O						8	8		20.07	160.56	34.00	75.00	9.00	6.47	4.20	125.61	342.23
			S									13.38								
			O																	
			S																	

Allen Robinson

- Shows apprentice classification
- Shows step percentage
- Attach copy of registration in approved DOL program with first payroll.

Mitchell Trubisky

- Although Staunton only worked 8 hours on this contract, he is entitled to 8 hours overtime. That is because Staunton worked 40 hours on other federally funded project this week.

HOW TO REPORT:

- * Times and wages if employee works more than one classification during the week.
- * When an employee moves.

U.S. DEPARTMENT OF LABOR
Wage and Hour Division

PAYROLL

OMB No.: 1235-0008
Expires 04/30/2018

NAME OF CONTRACTOR ☒ OR SUBCONTRACTOR ☐										ADDRESS													
ABC Construction										Moscow, Idaho													
PAYROLL NO. 11				FOR WEEK ENDING July 9, 2019						PROJECT AND LOCATION City of Moscow						PROJECT OR CONTRACT NO.							
(1) NAME AND IDENTIFICATION NUMBER OF EMPLOYEE	NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	OT. OR ST.	(4) DAY AND DATE							(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS						(9) NET WAGES PAID FOR WEEK			
				S	M	T	W	T	F	S				FICA	WITH- HOLDING TAX	Health	IRA	OTHER (Union Dues)	TOTAL DEDUCTIONS				
				3	4	5	6	7	8	9													
				HOURS WORKED EACH DAY																			
Matthew Stafford	1	Carpenter	O										242.56	24.43	74.80	8.35	4.18	5.25	117.01	300.59			
			S		8	8	4		3		23	8.92											
Matthew Stafford	1	General Laborer	O						1		1	10.20											
			S				4				4	6.80											
Jamaal Charles	2	Carpenter	O									356.80	20.87	54.50	7.14	3.57	3.20	89.28	267.52				
			S		8	8	8	8	8		40	8.92											

Matthew Stafford

- Since Stafford worked at more than one classification during the week:
- Use 2 lines, one for each classification
- Gross amount earned can be totaled and entered on one line

HOW TO REPORT: * Working Subcontractor
 * Owner Working with Employees.

U.S. DEPARTMENT OF LABOR
 Wage and Hour Division

PAYROLL

OMB No.: 1235-0008
 Expires 04/30/2018

NAME OF CONTRACTOR ☒ OR SUBCONTRACTOR ☐										ADDRESS										
ABC Construction										Moscow, Idaho										
PAYROLL NO. 1 - Initial					FOR WEEK ENDING July 9, 2019					PROJECT AND LOCATION City of Moscow					PROJECT OR CONTRACT NO.					
(1) NAME, AND IDENTIFICATION NUMBER OF EMPLOYEE	NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	OT. OR ST.	(4) DAY AND DATE							(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS						(9) NET WAGES PAID FOR WEEK
				S	M	T	W	T	F	S				FICA	WITH- HOLDING TAX	Health	IRA	OTHER (Union Dues)	TOTAL DEDUCTIONS	
				3	4	5	6	7	8	9										
Walter Payton #4567	2	Carpenter	O										940.00	82.00	75.00	60.			217.00	723.00
			S		8	8	8	8	8		40	23.50								
Travis Kelce #9876	1	Carpenter	O										940.00	82.00	75.00	60.			217.00	723.00
			S		8	8	8	8	8		40	23.50								
Antonio Brown #3456	2	Painter	O											Self Employed Public Works License #05461						
			S																	

- Working Subcontractor
 - Report on payroll of whomever hires him or her

Cam Newton #7890	1	Carpenter	O											Owner						
			S		8	8	8	8	8		40									
Wes Welker #4567	2	Carpenter	O										940.00	82.00	75.00	60.			217.00	723.00
			S		8	8	8	8	8		40	23.50								
Russell Wilson #1065	1	Carpenter	O										940.00	82.00	75.00	60.			217.00	723.00
			S		8	8	8	8	8		40	23.50								

Instructions for Payroll Form WH-347 Grant Funded Projects

General: Form WH-347 has been made available for the convenience of contractors and subcontractors required by their Federal or Federally-aided construction-type contracts and subcontracts to submit weekly payrolls. Properly filled out, this form will satisfy the requirements of Regulations, Parts 3 and 5 (29 C.F.R., Subtitle A), as to payrolls submitted in connection with contracts subject to the Davis-Bacon and related Acts.

While completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to the information collection contained in 29 C.F.R. §§ 3.3, 5.5(a). The Copeland Act (40 U.S.C § 3145) requires contractors and subcontractors performing work on Federally financed or assisted construction contracts to “furnish weekly a statement with respect to the wages paid each employee during the preceding week.” U.S. Department of Labor (DOL) Regulations at 29 C.F.R. § 5.5 (a)(3)(ii) require contractors to submit weekly a copy of all payrolls to the Federal agency contracting for or financing the construction project, accompanied by a signed “statement of Compliance” indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine that employees have received legally required wages and fringe benefits.

Under the Davis-Bacon and related Acts, the contractor is required to pay not less than prevailing wage, including fringe benefits, as predetermined by the Department of Labor. The contractor’s obligation to pay fringe benefits may be met either by payment of the fringe benefits to bona fide benefit plans, funds or programs, or by making payments to the covered workers (laborers and mechanics) as cash in lieu of fringe benefits.

This payroll provides for the contractor to show on the face of the payroll all the monies to each worker, whether as basic rates or as cash in lieu of fringe benefits, and provides for the contractor’s representation in the statement of compliance on the payroll (as shown on page two of payroll) that he/she is paying for fringe benefits required by the contract and not paid as cash in lieu of fringe benefits. Detailed instructions concerning the preparation of the payroll follow:

Contractor or Subcontractor: Fill in your firm’s name and check appropriate box.

Address: Fill in your firm’s address.

Payroll No.: Beginning with the number “1”, list the payroll number for the submission

For Week Ending: List the workweek ending date.

Project and Location: Self-explanatory

Project or Contract No.: Self-explanatory

Column 1 – Name and Individual Identifying Number of Worker: Enter each worker’s full name and an individual identifying number (e.g., last four digits of worker’s social security number) on each weekly payroll submitted.

Column 2 – No. of Withholding Exemptions: This column is merely inserted for the employer’s convenience and is not a requirement of Regulations, Part 3 and 5.

Column 3 - Work Classifications: List classification descriptive of work actually performed by each laborer or mechanic. Consult classification and minimum wage schedule set forth in contract specifications. If additional classifications are deemed necessary, see Contracting Officer of Agency representative. An individual may be shown as having worked in more than one classification provided an accurate breakdown of hours worked in each classification is maintained and shown on the submitted payroll by use of separate entries.

Column 4 - Hours Worked: List the day and date and second straight time and overtime hours worked in the applicable boxes. On all contracts subject to the Contract Work Hours Standard Act, enter hours worked in excess of 40 hours a week as “overtime.”

Column 5 - Total: Self-explanatory.

Column 6 - Rate of Pay: In the “straight time” box for each worker, list the actual hourly rate paid for straight time worked, plus cash paid in lieu of fringe benefits paid. When recording the straight time hourly rate, any cash paid in lieu of fringe benefits may be shown separately from the basic rate. For example, “12.50/.40” would reflect a \$12.25 base hourly rate plus \$0.40 for fringe benefits. This is of assistance in correctly computing overtime. See “Fringe Benefits” below. When overtime is worked, show the overtime hourly rate paid plus any cash in lieu of fringe benefits paid in the “overtime” box for each worker; otherwise, you may skip this box. See “Fringe Benefits” below. Payment of not less than time and one-half the basic or regular rate paid is required for overtime under the Contract Work Hours Standard Act of 1962 if the prime contract exceeds \$100,000. In addition to paying no less than the predetermined rate for the classification which an individual works, the contractor must pay amounts predetermined as fringe benefits in the wage decision made part of the contract to approved fringe benefit plans, funds or programs or shall pay as cash in lieu of fringe benefits. See “FRINGE BENEFITS” below.

Column 7 – Gross Amount Earned: Enter gross amount earned on this project. If part of a worker’s weekly wage was earned on projects other than the project described on this payroll, enter in column 7 first enter amount earned on the Federal or Federally assisted project and then the gross amount earned during the week on all projects, thus “\$163.00/\$420.00” would reflect the earnings of a worker who earned \$163.00 on a Federally assisted construction project during a week in which \$420.00 was earned on all work.

Column 8 - Deductions: Five columns are provided for showing deductions made. If more than five deductions are involved, use the first four columns and show the balance deductions under the fifth “Other” column; show actual total under “Total Deductions” column; and in the attachment to the payroll describe the deduction(s) contained in the “Other” column. All deductions must be in accordance with the provisions of the Copeland Act Regulations, 29 C.F.R., Part 3. If an individual worked on other jobs in addition to this project, show actual deductions from his/her weekly gross wage, and indicate that deductions are based on his gross wages.

Column 9 - Net Wages Paid for Week: Self-explanatory.

Totals – Space has been left at the bottom of the columns so that totals may be shown if the contractor so desires.

Statement Required by Regulations, Parts 3 and 5: While the “statement of compliance” need not be notarized, the statement (on page 2 of the payroll form) is subject to the penalties provided by 18 U.S.C. § 1001, namely, a fine, possible imprisonment of not more than 5 years, or both. Accordingly, the party signing this statement should have knowledge of the facts represented as true.

Items 1 and 2: Space has been provided between items (1) and (2) of the statement for describing any deductions made. If all deductions made are adequately described in the “Deductions” column above, state “See Deductions

column in this payroll.” See “FRINGE BENEFITS” below for instructions concerning filling out paragraph 4 of the statement.

Item 4 FRINGE BENEFITS – Contractors who pay all required fringe benefits: If paying all fringe benefits to approved plans, funds, or programs in amounts not less than were determined in the applicable wage decision of the Secretary of Labor, show the basic cash hourly rate and overtime rate paid to each worker on the face of the payroll and check paragraph 4(a) of the statement on page 2 of the WH-347 payroll form to indicate the payment. Note any exceptions in section 4(c).

Contractors who pay no fringe benefits: if not paying all fringe benefits to approved plans, funds, or programs in amounts of at least those that were determined in the applicable wage decision of the Secretary of Labor, pay any remaining fringe benefit amount to each laborer and mechanic and insert in the “straight time” of the “Rate of Pay column of the payroll an amount not less than the predetermined rate for each classification plus the amount of fringe benefits determined for each classification in the application wage decision. Inasmuch as it is not necessary to pay time and a half on cash paid in lieu of fringe benefits, the overtime rate shall not be less than the sum of the basic predetermined rate, plus the half time premium on basic or regular rate, plus the required cash in lieu of fringe benefits at the straight time rate. In addition, check paragraph 4(b) of the statement on page 2 of the payroll form to indicate the payment of fringe benefits in cash directly to the workers. Note any exceptions in section 4 (c).

Use of Section 4(c), Exceptions: Any contractor who is making payment to approved plans, funds, or programs in amounts less than the wage determination requires is obliged to pay the deficiency directly to the covered worker as cash in lieu of fringe benefits. Enter any exceptions to section 4(a) or 4(b) in section 4(c). Enter in the Exception column the craft, and enter in the Explanation column the hourly amount paid each worker as cash in lieu of fringe benefits and the hourly amount paid to plans, funds or programs as fringe benefits. The contractor must pay an amount not less than the predetermined rate plus cash in lieu of fringe benefits as shown in section 4(c) to each such individual for all hours worked (unless otherwise provided by applicable wage determination) on the Federal or Federally assisted project. Enter the rate paid and amount of cash paid in lieu of fringe benefits per hour in column 6 on the payroll. See paragraph on “Contractors who pay no fringe benefits” for computation of overtime rate.

**CITY OF MOSCOW
IDEQ STATE RFL-DW-1406F
BOOSTER STATION REPLACEMENT – PHASE II REBID
MOSCOW, IDAHO**

See pages 58 through 65 for the forms that need to be completed and returned to the Grants Administrator.

Payroll may be completed by hand on this paper form, or a computerized or online printable version provided all the same information is included, on a weekly basis as stated in the instructions above. The original signed version must be mailed within seven (7) days to the Grants Division, City of Moscow, PO Box 9203, Moscow, ID 83843 or emailed to grantsmanager@ci.moscow.id.us.

U.S. DEPARTMENT OF LABOR

PAYROLL

Wage and Hour Division

(For Contractor's Optional Use: See Instructions at www.dol.gov/whd/forms/wh347instr.htm)

OMB No.: 1215-0149

OMB No. 1235-0008

Expires: 04/30/2018

NAME OF CONTRACTOR ☐ OR SUBCONTRACTOR ☐										ADDRESS									
PAYROLL NO.				FOR WEEK ENDING						PROJECT AND LOCATION				PROJECT OR CONTRACT NO.					
(1) NAME, AND EMPLOYEE NUMBER	NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	OT. OR ST.	(4) DAY AND DATE							(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS					(9) NET WAGES PAID FOR WEEK
				HOURS WORKED EACH DAY										FICA	WITH- HOLDING TAX			OTHER	
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While completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to the information collection contained in 29 C.F.R. §§ 3.3, 5.5(a). The Copeland Act (40 U.S.C. § 3145) contractors and subcontractors performing work on Federally financed or assisted construction contracts to "furnish weekly a statement with respect to the wages paid each employee during the preceding week." U.S. Department of Labor (DOL) regulations at 29 C.F.R. § 5.5(a)(3)(ii) require contractors to submit weekly a copy of all payrolls to the Federal agency contracting for or financing the construction project, accompanied by a signed "Statement of Compliance" indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine that employees have received legally required wages and fringe benefits. **Public Burden Statement** We estimate that it will take an average of 55 minutes to complete this collection, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. If you have any comments regarding these estimates or any other aspect of this collection, including suggestions for reducing this burden, send them to the Administrator, Wage and Hour Division, U.S. Department of Labor, Room S3502, 200 Constitution Avenue, N.W. Washington, D.C. 20210

Date _____

I, _____
(Name of signatory party) _____ (Title)
do hereby state:

(1) That I pay or supervise the payment of the persons employed by

_____ on the
(Contractor or subcontractor)

_____ ; that during the payroll period commencing on the
(Building or work)

_____ day of _____, 20_____, and ending the _____ day of _____, 20_____,
all persons employed on said project have been paid the full weekly wages earned, that no rebates have
been or will be made either directly or indirectly to or on behalf of said

_____ from the full
(Contractor or subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly
from the full wages earned by any person, other than permissible deductions as defined in Regulations,
Part 3 (29 CFR Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48
Stat. 948, 63 Stat. 108, 72 Stat. 967, 76 Stat. 357; 40 U.S.C. §3145), and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are
correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the
applicable wage rates contained in any wage determination incorporated into the contract; that the
classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide
apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of
Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in
a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR
PROGRAMS

☐ -In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the
above referenced payroll, payments of fringe benefits as listed in the contract have been
or will be made to appropriate programs for the benefit of such employees, except as
noted in Section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ -Each laborer or mechanic listed in the above referenced payroll has been paid, as
indicated on the payroll, an amount not less than the sum of the applicable basic
hourly wage rate plus the amount of the required fringe benefits as listed in the
contract, except as noted in Section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION
REMARKS	

NAME AND TITLE	SIGNATURE
THE WILFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.	

**CITY OF MOSCOW
IDEQ STATE RFL-DW-1406F
BOOSTER STATION REPLACEMENT – PHASE II REBID
MOSCOW, IDAHO**

**Payroll Signature Authorization Form
Certificate from Contractor/Subcontractor Appointing Officer
or Employee to Supervise Payment of Employees**

(I) (We) hereby certify that (I am) (we are) (the prime contractor) (a subcontractor) for _____ (Specify "General Construction," i.e., plumbing, electrical, etc.) in connection with construction of the above mentioned Project, and (I) (we) have appointed, whose signature appears below, to supervise the payment of (my) (our) employees beginning (Date: mm/dd/yyyy) _____. That he/she is in a position to have knowledge of the facts set forth in the payroll documents and in the Statement of Compliance required by the so-called Kick-Back Statute that he is to execute with (my) (our) full authority and approval until such times as (I) (we) submit to the **Grants Division of the City of Moscow** a new certificate appointing some other person for the purposes hereinabove stated.

Printed Name of Appointee

Name of Contractor/Subcontractor

Signature of Appointee

Signature Authorizing Appointee (see NOTE below)

Title

Title

Date

Date

NOTE: This certificate must be executed by an authorized officer of a corporation or by a member of a partnership, and shall be executed prior to and submitted with the first payroll. Should the appointee be changed, a new certificate must accompany the first payroll for which the new appointee executes a statement of compliance required by the Kick-Back Statute.

Complete the above information and mail or email this original form to the following attention:

Grants Division
City of Moscow
PO Box 9203
Moscow, ID 83843
grantsmanager@ci.moscow.id.us

**CITY OF MOSCOW
IDEQ STATE RFL-DW-1406F
BOOSTER STATION REPLACEMENT – PHASE II REBID
MOSCOW, IDAHO**

Payroll Overview

Contractor/Subcontractor: _____

Wage Decision Nos. and Modification(s): Idaho, Building ID20220015, 07/29/2022
Idaho, Heavy ID20220065, 07/15/2022
Idaho, Highway ID20220082, 02/25/2022

Name of Payroll Clerk: _____

As Listed on the Payroll Authorization Form

Contact Number for Payroll Clerk _____

(Telephone and Email)

List below the job classification, basic hourly rate, and fringe benefit rate for each job classification of employees you will utilize during the entire project. You must use the job classification from the approved wage decision listed above. If the approved wage decision does not include a job classification needed for the project, an additional job classification must be obtained. The Wage Decision list above is attached.

JOB CLASS	BASIC HOURLY RATE*	FRINGE BENEFIT RATE	OVERTIME RATE
“Power Equipment Operator – Bulldozer”			

*The basic hourly rate includes the zone rate where applicable

Check the applicable box:

1. ☐ All Fringe benefits are paid in cash for all employees.
2. ☐ All Fringe benefits are paid to a plan for all employees
3. ☐ Fringe benefits are paid part in cash and part to a plan for all employees

If Fringe benefits are paid in whole or part to a plan, attach a copy of the:

- Letter from U.S. Department of Labor declaring plan acceptable (if available) **or**;
- Plan(s) and documentation(s) of payment for all funded plans, including but not limited to the Health Insurance Plan, Retirement Plan, Liability Insurance, and Disability Insurance.

CERTIFICATION

The Wage Determination, a Davis-Bacon poster, and an Equal Opportunity poster are posted at the job site.

Complete the above information and mail or email this original form to the following attention:

Grants Division, City of Moscow, PO Box 9203, Moscow ID 83843

grantsmanager@ci.moscow.id.us.

**CITY OF MOSCOW
IDEQ STATE RFL-DW-1406F
BOOSTER STATION REPLACEMENT – PHASE II REBID
MOSCOW, IDAHO**

**Prime Contractor's Certification
Concerning Federal Labor Standards (Davis Bacon)**

The undersigned prime contractor, having executed a contract with the local government of the City of Moscow Idaho, in the amount \$_____ for the construction of the above-identified project, certifies that:

3. He/she will comply with the Federal Labor Standards Provisions (e.g. Davis-Bacon Act, Copeland Act, Contract Work Hours and Safety Standards Act) and Prevailing Wage Decision(s) are included in the project's contract documents.

All laborers and mechanics employed on the project will be paid according to the appropriate Prevailing Wage Decision # Building ID20220015 07/29/2022, Heavy ID20220065 07/15/2022 or Highway ID20220082 02/25/2022.

4. Corrections of any infractions of the Federal Labor Standards Provisions, including infractions by any subcontractors and any lower tier subcontractors, is this contractor's responsibility.
5. Neither this contractor, any subcontractor, nor any affiliates, have been declared ineligible to participate in federally funded construction projects.
6. Contractor agrees to obtain and forward all Subcontractors' Certification concerning Federal Labor Standards Provisions and Prevailing Wage requirements to the Local Government or Local Government's representative within ten (10) days after execution of any subcontract.

Prime Contractor

Tax ID Number

Street/Mailing Address

City, State, Zip

Printed Name of Prime Contractor

DUNS Number

Prime Contractor Signature

Date

Complete the above information and mail or email this original form to the following attention:
Grants Division City of Moscow, PO Box 9203, Moscow ID 83843
grantsmanager@ci.moscow.id.us

**CITY OF MOSCOW
IDEQ STATE RFL-DW-1406F
BOOSTER STATION REPLACEMENT – PHASE II REBID
MOSCOW, IDAHO**

**Subcontractor's Certification
Concerning Federal Labor Standards (Davis Bacon)**

The undersigned subcontractor, having executed a contract with _____ (Prime Contractor), in the amount \$ _____ for _____
(Nature of Work i.e. Electrical) for the above-identified project certifies that:

1. He/she will comply with the Federal Labor Standards Provisions (e.g. Davis-Bacon Act, Copeland Act, Contract Work Hours and Safety Standards Act) and Prevailing Wage Decision(s) are included in the project's contract documents.
2. All laborers and mechanics employed on the project will be paid according to the appropriate Prevailing Wage Decision # Building ID20220015 07/29/2022, Heavy ID20220065 07/15/2022 or Highway ID20220082 02/25/2022.
3. Corrections of any infractions of the Federal Labor Standards Provisions, including infractions by any lower tier subcontractors, is this subcontractor's responsibility.
4. Neither this subcontractor, nor any affiliates, have been declared ineligible to participate in federally funded construction projects.
5. This subcontractor agrees to forward a Subcontractor's Certification concerning Federal Labor Standards Provisions and Prevailing Wage requirements to the Local Government's representative within ten (10) days after execution of any subcontract.

Subcontractor

Tax ID Number

Street/Mailing Address

City, State, Zip

Printed Name of Subcontractor

DUNS Number (if available)

Subcontractors Signature

Date

Complete the above information and mail or email this original form to the following attention:
Grants Division, City of Moscow, PO Box 9203, Moscow ID 83843
grantsmanager@ci.moscow.id.us

**CITY OF MOSCOW
IDEQ STATE RFL-DW-1406F
BOOSTER STATION REPLACEMENT – PHASE II REBID
MOSCOW, IDAHO**

NO WORK PERFORMED

I hereby certify that no work was performed by the undersigned contractor/subcontractor and/or employees on the construction of the above-referenced project during the period dating from _____ 20__ through _____ 20__.

Contractor/Subcontractor: _____

Signed By: _____

Title: _____

Date: _____

Comments: _____

Questions regarding this form can be emailed to the Grants Division at grantsmanager@ci.moscow.id.us or by phone at 208.883.7035.

Complete the above information and mail or email this original form within seven (7) days of the normal payroll weekending to the following attention:

Grants Division
City of Moscow
PO Box 9203
Moscow ID 83843
grantsmanager@ci.moscow.id.us

**CITY OF MOSCOW
IDEQ STATE RFL-DW-1406F
BOOSTER STATION REPLACEMENT – PHASE II REBID
MOSCOW, IDAHO**

Employee Voluntary Deduction Authorization Form

I have chosen to enroll in the payroll deduction programs made available on a voluntary basis. I hereby authorize _____ my employer, to withhold from my compensation for the programs checked below for the corresponding, one time only deduction program or a continuous deduction program. The consent to participate in these programs is not a condition either for the obtaining of or for the continuation of employment.

**One Time
Only**

Continuous

☐	☐	Reconciliation of a wage advance – 29 CFR 3.5 § b
☐	☐	Health Insurance plan – 29 CFR 3.5 § d
☐	☐	Retirement Plan (IRA, 401K, or other pension plan) – 29 CFR 3.5 § d
☐	☐	Liability Insurance – 29 CFR 3.5 § d
☐	☐	Disability Insurance – 29 CFR 3.5 § d
☐	☐	Vacation Plan (funded program) – 29 CFR 3.5 § d
☐	☐	Loan Repayment to Credit Unions– 29 CFR 3.5 § f
☐	☐	Union Dues – 29 CFR 3.5 § i
☐	☐	Tool withholding, which is a direct benefit to me – 29 CFR 3.5 § j & k
☐	☐	Other: _____
☐	☐	Other: _____

Printed Name of Employee

Signature of Employee

Date

If apprentice is employed please attach the building.

- A copy of the signed collective bargaining agreement for Unions (if applicable) **and**;
- Letter from U.S. Department of Labor declaring plan acceptable (if available) **or**;
- Plan(s) and documentation(s) of payment for all funded plans, including but not limited to the Health Insurance Plan, Retirement Plan, Liability Insurance, and Disability Insurance.

Questions regarding this form can be emailed to the Grants Division at grantsmanager@ci.moscow.id.us or by phone at 208.883.7035.

Complete the above information and mail or email this original form and the attachment(s) within seven (7) days of the normal payroll weekending to the following attention:
Grants Division, City of Moscow, PO Box 9203, Moscow ID 83843
grantsmanager@ci.moscow.id.us

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City of Moscow

Latah County, Idaho



Booster Station Replacement – Phase II Rebid

REBID SET

AUGUST 2022

VOLUME II OF III
TECHNICAL SPECIFICATIONS

ENGINEER:



J-U-B ENGINEERS, Inc

201 S. Jackson St.
Moscow, Idaho 83843
(208) 746-9010
www.jub.com

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**City of Moscow
Booster Station Replacement – Phase II Rebid**

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- 03930 – Concrete Rehabilitation

Division 4 Masonry

- 04010 – Maintenance of Masonry
- 04100 – Mortar and Grout
- 04200 – Reinforced Unit Masonry
- 04270 – Glass Unit Masonry

Division 5 Metals

- 05500 – Metal Fabrications

Division 6 Wood and Plastics

- 06100 – Rough Carpentry
- 06160 – Wood Sheathing
- 06175 – Shop Fabricated Wood Trusses

Division 7 Thermal and Moisture Protection

- 07141 – Cold Fluid-Applied Waterproofing & Drainage Mat System
- 07191 – Vertical Water Repellents
- 07210 – Building Insulation
- 07214 – Foamed-In-Place Masonry Wall Insulation
- 07275 – Weather Barrier
- 07400 – Metal Roof and Soffit Panels
- 07411 – Metal Wall Panels
- 07461 – Composite Trim
- 07620 – Sheet Metal Flashing and Trim
- 07720 – Snow Retention System
- 07920 – Joint Sealants

Division 8 Doors and Windows

- 08110 – Metal Doors and Frames
- 08710 – Door Hardware

Division 9 Finishes

- 09900 – High-Performance Coatings
- 09910 – Architectural Paints and Coatings

Division 10 Specialties

- 10520 – Fire Protection

Division 11 Equipment

- 11000 – General Requirements for Equipment
- 11103 – Vertical Multistage Pump
- 11111 – Horizontal End Suction Pump

Division 15 Mechanical

- 15060 – Pipe and Pipe Fittings
- 15100 – Valves

Division 16 Electrical

See electrical Table of Contents.

Appendix A

City of Moscow Standard Construction Specifications and Standard Construction Drawing

Appendix B

Geotechnical Engineering Evaluation – Proposed Moscow Booster Pump Stations – Phase II
Moscow, Idaho

**SECTION 01010
SUMMARY OF WORK**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Contractor Use of Site and Premises
- B. Work Sequence
- C. Owner Occupancy

1.2 GENERAL DESCRIPTION OF WORK

- A. Two booster pump stations that include:
 - 1. Pump Installation
 - a. Duty Pumps: Vertical Inline Multistage
 - b. Jockey Pumps: Vertical Inline Multistage
 - c. Fire Flow Pumps: Horizontal End Suction
 - 2. Booster Pump station with a structure consisting of concrete foundation, CMU exterior walls, and truss roof.
 - 3. Booster Pump Station process piping, fittings, isolation valves, check valves, pressure reducing valves, pressure gauges, flow meters, etc.
 - 4. Booster Pump Station electrical system, instrumentation and control (I&C) system, HVAC system, lighting system, etc.
 - 5. Site grading, surfacing, site stormwater routing, and related site work.
 - 6. Water main yard piping and connection to existing system.
 - 7. Electrical per Division 16 and plan sheets.
 - 8. Backup power generator
 - 9. Site fencing (Indian Hills Only)
 - 10. Booster Pump Station start-up.

1.3 APPLICABLE STANDARDS

- A. The current version of the City of Moscow Standard Specifications and Construction Drawings will apply to this project except as modified by these Contract Documents. Digital

copies of the construction drawings will be provided upon request or can be found on the City of Moscow website (<https://www.ci.moscow.id.us/352/Public-Works>). The City of Moscow Standard Specifications and Construction Drawings are attached to these technical specifications in 8.5" X 11" format.

1.4 CONTRACTOR USE OF SITE AND PREMISES

- A. Limit use of site and premises to:
 - 1. Allow access by property owners for construction inspection.
 - 2. Maintain work schedule to allow through traffic at all times.
 - 3. Retain and protect all existing facilities and vegetation not otherwise designated.
- B. Construction operations limited to rights-of-way and easements and as shown on the plans.
- C. Time restrictions for performing work. Work shall start no earlier than 7:00 a.m. and shall end no later than 7:00 p.m. Monday through Friday unless authorized by the Engineer. Noisy operations shall be limited to the hours of 8:00 a.m. to 5:00 p.m. No work shall be performed on weekends or Owner recognized holidays, unless authorized by the Engineer.

1.5 WORK SEQUENCE

- A. Construct work in an orderly and timely manner and minimize vehicular and pedestrian traffic disruption. Accommodate traffic and access requirements during the construction period. Coordinate construction schedule and operations with Engineer and Owner.
- B. Construct all system improvements in such a manner as to keep water systems operational unless specifically authorized otherwise by the Owner.
- C. Coordinate with utility companies for timely completion of required services. Connection fees charged by other utilities shall be billed to and paid directly by the Owner.
 - 1. Indian Hills Booster Pump Station
 - a. Coordinate connection to the 12-inch water main with Owner and Indian Hills Waterline Project (completed by others).
 - 2. Ponderosa Booster Pump Station
 - a. Coordinate shutdown of 10-inch and 6-inch water main with Owner prior to connection of piping to the existing system.

1.6 OWNER OCCUPANCY

- A. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- B. Schedule the work to accommodate this requirement.

1.7 REQUIRED PERMITS

- A. Building Permit. Owner will secure permit and pay any associated costs. Contractor shall coordinate with building department for inspections.
- B. All other permits to be obtained and paid by the Contractor.

1.8 GENERALIZED CONSTRUCTION SEQUENCING

- A. The Contractor must provide a sequencing plan in the form of a construction schedule. Schedule shall correspond to the approved schedule of values.
 - 1. Booster Pump Station Start-ups shall be coordinated with the Owner.
- B. Submit operations and maintenance information.
- C. Provide operator training with manufacturer's representatives.
- D. Complete punch list items.

1.9 Suspension of Contract Time for Equipment Delay

- A. A suspension of Contract Time due to equipment delay is allowed if necessary and if requested by Contractor as noted in the Agreement.
- B. The following requirements shall apply during the suspension of Contract Time.
 - 1. All site control requirements set forth in the Contract Documents shall remain in effect.
 - 2. For any areas not receiving final surface repair prior to the suspension of Contract Time, the Contractor shall be responsible for dust control, storm water management and erosion control maintenance, inspections, reporting and all work required to maintain the intended use of the specific areas.
 - 3. All bonds and insurance as required by the Contract Documents shall remain in effect.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

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**SECTION 01025
MEASUREMENT AND PAYMENT**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Submittals
- B. Schedule of Values
- C. Schedule of Estimated Progress Payments
- D. General Description of Measurement and Payment
- E. Application for Payment
- F. Nonpayment for Rejected or Unused Goods
- G. Partial Payment for Stored Materials and Equipment
- H. Defect Assessment
- I. Unit Prices
- J. Schedule of Bid Items

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Project Schedule: Updated progress schedule documenting work to-date and adherence to project times.
 - 2. Schedule of Values: Submit on Contractor's standard forms.
 - 3. Schedule of Estimated Progress Payments:
 - a. Submit with initially acceptable Schedule of Values.
 - b. Submit adjustments thereto with Application for Payment.
 - 4. Application for Payment.
 - 5. Final Application for Payment.

1.3 SCHEDULE OF VALUES

- A. Prepare a separate Schedule of Values for each schedule of the work under the Agreement. Submit Schedule of Values to the Engineer for approval, under Section

SECTION 01025 - 1 MEASUREMENT AND PAYMENT

01300, within fifteen (15) days after receiving the Notice of Award. Schedule of Values shall list values for all Work for complete installation to serve as the basis for computing values for progress payments during construction.

- B. Take all measurements and compute quantities to estimate percent complete of each item listed in the Schedule of Values. The Engineer will review measurements, quantities, and percent complete.
- C. Lump Sum Work:
 - 1. The Schedule of Values shall include all equipment, additive alternates (as applicable), specified allowances, labor, tools, materials, piping, fittings, temporary bypass, environmental controls and permitting, appurtenances, and all other items of expense for a complete and properly functional installation as shown on the Drawings and described in the Specifications and Contract Documents.
 - 2. List bonds and insurance premiums, mobilization, demobilization, and contract closeout separately in the Schedule of Values.
 - 3. Payment shall be made at the approved Schedule of Value prices. Provide a breakdown of costs by corresponding Technical Division (e.g., 1-16). Within the Technical Division Schedule of Values breakdown, itemize each equipment item separately with separate amounts for 1) Equipment Purchase and Delivery, and 2) Equipment Installation, Training, & Commissioning. The following payment schedule describes the maximum cumulative percentages that shall be paid in progress payments for the listed project milestones. Scheduled Values for individual process equipment items shall include the material and labor for all packaged components (instruments, control panels, etc.) supplied by a single vendor associated with that equipment item.

Scheduled Value	Approved Submittal	Delivered and Stored On-Site ^(b)	Initial Starting and Testing ^(a)	Completed Owner Training	Completed Commissioning	Approved Final O&M Manual
Equipment Purchase & Delivery	10%	85%	90%	95%	100%	---
Equipment Installation, Training, & Commissioning	0%	0%	85%	90%	95%	100%

^(a) See Section 01650

^(b) Must include approved draft O&M Manual for equipment

- D. An unbalanced or front-end loaded schedule will not be acceptable.
- E. Summation of the complete Schedule of Values representing all the work shall equal the Contract Price.

- F. Submit Schedule of Values in spreadsheet format compatible with latest version of Microsoft Excel.

1.4 SCHEDULE OF ESTIMATED PROGRESS PAYMENTS

- A. Show estimated payment requests throughout Contract Times aggregating initial Contract Price.
- B. Base estimated progress payments on initially acceptable progress schedule. Adjust to reflect subsequent adjustments in progress schedule and Contract Price as reflected by modifications to the Contract Documents.

1.5 GENERAL DESCRIPTION OF MEASUREMENT AND PAYMENT

- A. Measurement and Payment for the bid items listed in the Bid Schedule shall be on the basis of the description in the Contract Documents. Unless the work to be done is specifically called out to be measured and paid for in the Bid Schedule, payment for such work shall be included in other applicable items, and there shall be no separate measurement and payment for the work.
- B. Items listed in the Bid Schedule as lump sum (LS) shall include all work for the complete installation as generally described in the Contract Documents.
- C. Payment shall be made at the contract unit bid price listed in the Bid Schedule. The price listed therein shall be payment in full for all labor, tools, equipment, materials, etc., which are required to construct the respective bid items according to the Contract Documents including all work and materials incidental thereto.
- D. Partial payment for unit bid items and lump sum bid items only partially completed at the end of monthly pay periods shall be made based upon the percentage of work completed.

1.6 APPLICATION FOR PAYMENT

- A. Include accepted Schedule of Values for each schedule or portion of work, the unit price breakdown for the work to be paid on unit price basis, if applicable, and allowances, as appropriate.

1.7 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

- A. Payment will not be made for the following:
 - 1. Loading, hauling, and disposing of rejected material.
 - 2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.

3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.
 4. Material not unloaded from transporting vehicle.
 5. Defective work not accepted by Owner.
 6. Material remaining on hand after completion of Work.
 7. Products placed beyond lines and levels of required Work.
- B. If, in the opinion of the Engineer, it is not practical to remove and replace the Work:
1. Owner will direct one of the following remedies:
 - a. The defective Work may remain, but the unit sum will be adjusted to a new sum at the discretion of the Engineer.
 - b. The defective Work will be partially repaired to the instructions of the Owner, and the unit sum will be adjusted to a new sum at the discretion of the Engineer.
 2. The individual specification sections may modify these options or may identify a specific formula or percentage sum/price reduction.
 3. The authority of the Engineer to assess the defect and identify payment adjustment is final.

1.8 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored on site unless submittals and/or Shop Drawings have been reviewed by Engineer with no exceptions. The items must be properly stored, secured, and maintained in accordance with manufacturer's requirements and Contract Documents.
- B. No payment shall be made for materials or equipment not delivered to the site.
- C. Final Payment: Final payment will be made for products only incorporated in work; remaining products, for which partial payments have been made, shall revert to Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

1.9 UNIT PRICES

- A. Take measurements and compute quantities. Engineer will review measurements and quantities.

- B. Quantities and measurements indicated in Bid Form are for estimation purposes only at the time of bidding and establishing initial contract price. Actual quantities and measurements supplied or placed in the Work shall determine payment unless specifically noted as “plan quantity.”
- C. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application or installation of item of the Work; overhead and profit.
- D. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by the Owner multiplied by unit sum/price for Work incorporated in or made necessary by the Work.

1.10 SCHEDULE OF BID ITEMS

A. BASE BID – INDIAN HILLS BOOSTER PUMP STATION

- 1. Basis of Measurement: Lump Sum
- 2. Basis of Payment: Payment will be made at the contract lump sum price for all project improvements, complete and operational, based on agreed upon Schedule of Values submitted by the Contractor. Included in this item are all costs to manufacture, construct, deliver, install, etc. all components of the Work and shall include coordination with the Owner, vendors, and other Contractors noted in the Contract Documents; progress meetings, project administration, submittals, equipment, materials, labor, excavation, backfill, compaction, watering/dewatering, erosion control (including SWPPP preparation and compliance), assembly, testing, startup, training, commissioning, and all other items of expense for a complete and functional system per the Contract Documents. Generally this work includes the following areas of work; Booster Pump Station, Site Improvements, Yard Piping, Site Stormwater, Electrical, Backup Power Generator.

B. BASE BID – PONDEROSA BOOSTER PUMP STATION

- 1. Basis of Measurement: Lump Sum
- 2. Basis of Payment: Payment will be made at the contract lump sum price for all project improvements, complete and operational, based on agreed upon Schedule of Values submitted by the Contractor. Included in this item are all costs to manufacture, construct, deliver, install, etc. all components of the Work and shall include coordination with the Owner, vendors, and other Contractors noted in the Contract Documents; progress meetings, project administration, submittals, equipment, materials, labor, excavation, backfill, compaction, watering/dewatering, erosion control (including SWPPP preparation and compliance), assembly, testing, startup, training, commissioning, and all other items of expense for a complete and functional

system per the Contract Documents. Generally this work includes the following areas of work; Booster Pump Station, Site Improvements, Yard Piping, Site Stormwater, Electrical, Backup Power Generator.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01039
COORDINATION AND MEETINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Coordination
- B. Field engineering
- C. Preconstruction conference

1.2 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements with provisions for accommodating items installed later.
- B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate completion and cleanup of Work of separate Sections in preparation for Substantial Completion.
- D. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
- E. Coordinate all work elements involving connection to existing systems with Owner to maintain continuous operation of all systems. A shut down may be arranged for tie-in connection with pre-planning and approval of the Engineer and the Owner.
- F. Repair any damage to existing facilities to equal or better conditions.

1.3 FIELD ENGINEERING AND SURVEY

- A. OWNER shall provide a construction survey as listed; however, additional survey other than what is listed below is the responsibility of CONTRACTOR. CONTRACTOR shall coordinate survey items with OWNER and shall allow a minimum of forty-eight (48) hours (over working days) notice to schedule a survey. Protecting and maintaining surveyed locations shall be the responsibility of CONTRACTOR. Replacement of survey points already established shall not be paid for separately by OWNER, but shall be arranged for and paid for separately by CONTRACTOR.
- B. Project staking will be provided, two times, by OWNER as follows:
 - 1. Booster Pump Station corners with offsets

2. Generator Pad corners with offsets
3. Alignment and bends of water main, including connection to existing
4. Curb Stakes at twenty-five foot (25 ') intervals
5. Junction box locations for underground conduit systems
6. Pavement markings

1.4 PRECONSTRUCTION CONFERENCE

- A. Engineer will schedule a conference after Notice of Award.
- B. Attendance Required: Owner or his representative, Engineer and Contractor.
- C. Agenda:
 1. Submission of executed bonds and insurance certificates.
 2. Distribution of Contract Documents.
 3. Submission of list of Subcontractors, list of products, Schedule of Values, and progress schedule.
 4. Designation of personnel representing the parties in Contract, and the Engineer.
 5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract close-out procedures.
 6. Scheduling. Contractor shall submit a schedule for the entire scope of work, including subcontractor work. The schedule must be approved by the Engineer prior to commencement of work. Update schedule monthly with each Application for Payment to the Engineer. Construction shall not proceed without a project schedule.
 7. Surveying, layout and scheduling.

1.5 UTILITY COORDINATOR

- A. Coordinate all construction activities with affected utilities including, but not limited to, City of Moscow and Avista Utilities.

1.6 PROGRESS MEETINGS

- A. The Engineer will schedule and administer meetings as needed by Owner, Contractor, Vendor(s), and agencies throughout progress of the Work. Anticipated to occur every two (2) weeks.
- B. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner,

SECTION 01039 - 2 COORDINATION AND MEETINGS

Engineer, as appropriate to agenda topics for each meeting.

C. Potential Agenda Topics:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, issues, and decisions.
4. Identification of issues that may impede planned progress.
5. Review of submittals schedule and status.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain project schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected work.
11. Maintenance of quality and work standards.
12. Review of cleanup and restoration.
13. Effect of proposed changes on progress schedule and coordination.
14. Any items constituting changes since previous meeting.
15. Pay requests pending.
16. Other business relating to Work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

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SECTION 01090
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance
- B. Schedule of references

1.2 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, complies with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

1.3 SCHEDULE OF REFERENCES

ACI	American Concrete Institute Box 19150 Reford Station Detroit, MI 48219
AGC	Associated General Contractors of America 1957 E Street, N.W. Washington, DC 20006
AIA	American Institute of Architects 1735 New York Avenue, N.W. Washington, DC 20006
AISC	American Institute of Steel Construction 400 North Michigan Avenue Eighth Floor Chicago, IL 60611
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, DC 20036
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018

ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWS	American Welding Society 550 LeJeune Road, N.W. Miami, FL 33135
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60195
EJCDC	Engineers' Joint Contract Documents Committee American Consulting Engineers Council 1015 15th Street, N.W. Washington, DC 20005
EJMA	Expansion Joint Manufacturers Association 25 North Broadway Tarrytown, NY 10591
FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407
ICBO	International Conference of Building Officials 5360 S. Workman Mill Road Whittier, CA 90601
IDEQ	Idaho Department of Environmental Quality Division of Drinking Water 1410 North Hilton Boise, ID 83706
IDPW	Idaho Department of Public Works 502 North Fourth Street Boise, ID 83720

IEEE	Institute of Electrical and Electronics Engineers 345 East 47th Street New York, NY 10017
ISPWC	Idaho Standards for Public Works Construction
LHTAC	Local Highway Technical Assistance Council 1436 West Bannock Street Boise, ID 83702
NCMA	National Concrete Masonry Association P.O. Box 781 Herndon, VA 22070
NEMA	National Electrical Manufacturers' Association 2101 "L" Street, N.W. Washington, DC 20037
NFPA	National Fire Protection Association Battery March Park Quincy, MA 02269
OSHA	Occupational Safety and Health Administration 200 Constitution Avenue, N.W. Washington, DC 20210
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077
PS	Product Standard U. S. Department of Commerce Washington, DC 20203
SSPC	Steel Structures Painting Council 4400 Fifth Avenue Pittsburgh, PA 15213

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01090 - 3

REFERENCE STANDARDS

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SECTION 01300 SUBMITTALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures
- B. Construction progress schedules
- C. Proposed products list
- D. Shop drawings
- E. Product data
- F. Samples and test specimens
- G. Manufacturers' instructions
- H. Manufacturers' certificates and quality control submittals

1.2 ADMINISTRATION

- A. A Web-based Cloud Construction Administration Software (Software) will be used throughout the construction process to aid the project communication and submittal review process at no cost, liability or responsibility to the Owner or Engineer.
- B. Contractor shall be responsible for all costs and fees associated with the software through the duration of the Contract.
- C. Contractor shall be responsible for all startup and setup required for the successful operation of the software. The Contractor shall provide assistance to and coordinate assistance as required throughout the project to the Engineer, the Owner, and their designated representatives to successfully apply the software and its application to the Project. The Engineer, Owner and their representatives are responsible for their own hardware, web access, and internal operating systems necessary to access the Cloud web-based software website.
- D. The use of Construction Administration Software does not eliminate the Contractors' responsibilities for maintaining in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction under the GC 7.11.
- E. The items below provide a general list of documents intended to be stored, transmitted and accessed with the Web-based Cloud Construction Administration Software:

SECTION 01300 - 1

SUBMITTALS

1. Bid Set Electronic Copy of Project Plans, Specifications, and Addenda
 2. Submittals including Shop Drawings – Contractor is required to include the submittal transmittal (an example is attached at the end of this section) with contractor's stamp per the documents with every submittal. Two exceptions for electronic submittals are known at this time:
 - a. All oversized (larger than 8.5-inch by 11-inch shop drawings submitted for review)
 3. Submittal Log Maintenance
 4. Requests for Information – A written request for information, requiring a written response, to Owner, Engineer, or Contractor, initiated by Owner, Engineer, or Contractor
 5. Electronic copies of executed Field Orders (GC 11.01.A.3)
 6. Electronic copies of executed Work Change Directives (GC 11.01.A.2)
 7. Electronic copies of executed Change Orders
 8. Contractor's Applications for Payment
 9. Electronic copies of executed Recommendation of Payment
- F. At the end of each three-month period during the construction process, the Contractor shall deliver to the Engineer as a required submittal, one electronic progress copy of all information exchanged through the Web-based Cloud system by all parties using the system for the project.
- G. Prior to Final Completion of the project, the Contractor shall deliver to the Engineer as a required submittal, three complete electronic copies of all information exchanged through the Web-based Cloud system by all parties using the system for the project. The information shall be on set(s) of DVDs or other suitable electronic storage media agreeable to the Engineer and the Owner. The information must be readily reviewable in standard operating system software generally and publicly available to the Owner and Engineer. The Engineer shall review the submitted electronic information for completeness and format and respond to the Contractor as to the acceptability of the submittal and/or any modifications or resubmittal that is required to be made and/or resubmitted by the Contractor.
- H. In the event that the Web-based Cloud system becomes unavailable, unusable, or otherwise unsuitable for continued use for this project at the sole discretion of the Engineer, the Contractor is responsible for delivering all electronic information previously transmitted for the project through the Construction Administration Software in an acceptable electronic format to the Engineer and/or paper copies of that information acceptable to the Engineer and Owner.

SECTION 01300 - 2

SUBMITTALS

- I. The Owner and Engineer reserve the right to require paper copies and transmittal procedures of any documents they deem necessary. Examples of such paper copies that are currently intended to be transmitted in hard-copy are: fully executed contracts, pay requests, change orders, control system drawings, rebar submittal drawings, final Operations and Maintenance information, and the Contractor's final record drawing information.
- J. For Hard (Paper Copy) Submittals and Samples:
 - 1. Contractor shall utilize the Construction Administration Software to assist tracking, posting, review, and return of review comments for all Hard (Paper Copy) Submittals and Samples.
 - a. For Samples, contractor shall submit one sample to Engineer (which will be retained).
 - b. For Paper Copies of Submittals (where deemed necessary by Engineer), submit three (3) copies to be retained by Engineer, plus the number required to be returned to the Contractor.
 - c. For electrical and HVAC submittals (where deemed necessary), submit four (4) copies to be retained by the Engineer, plus the number required to be returned to the Contractor.

1.3 SUBMITTAL PROCEDURES

- A. A submittal log shall be maintained by the Contractor through the Construction Administration Software.
- B. Coordinate and group submission of related items.
- C. The contractor is responsible for reviewing submittals prior to submitting to Engineer. Verify compatibility with field conditions, dimensions, product selections and designations, quantities, and conformance with Contract Documents.
- D. Sequentially number the submittals with XXXXX-YY-ZZ where:
 - 1. XXXXX is the 5-digit specification number
 - 2. YY is the different submittal for the specification
 - 3. ZZ is the number of times that submittal has been made, the initial submittal shall be "00"
- E. Identify Project, Contractor, Subcontractor or supplier, pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.

- F. Transmit each submittal with a letter of transmittal containing all pertinent information required for identification and checking of submittals. An example of a submittal transmittal appears at the end of this section. By submitting to Engineer, Contractor certifies that:
1. (i) CONTRACTOR has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and
 2. (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.
- G. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- H. Contractor shall identify all variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work. All deviations from the governing technical specifications and/or drawing shall be referenced to the appropriate paragraph of the section or page of the drawing. If there are no deviations, the statement shall be noted as such. Any submittal not accompanied by such a statement will be returned for resubmittal.
- I. Provide space for Contractor and Engineer review stamps.
- J. Revise and resubmit submittals as required, identify all changes made since previous submittal in the transmittal sheet or in a cover letter.
- K. The Contractor shall submit a copy of the technical specification with each subsection clearly marked for conformance to the subsection or exceptions taken. Where exceptions are taken, all necessary information and supporting calculations to evaluate the deviation shall be attached. The Owner retains the right to reject the proposed deviation in favor of the specification, as written.
- L. The Contractor shall be responsible for submitting complete and accurate information in accordance with the Contract Documents.

1.4 SUBMITTAL REVIEW

- A. The Engineer's review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with the requirements of the plans and specifications. Review of a specific item shall not include review of an assembly of which the item is a component. Contractor is responsible for: dimensions to be

confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work of all trades; and for performing all work in a safe and satisfactory manner.

- B. Engineer's review will result in the following submittal review designations:
 - 1. No Exceptions Taken – does not require resubmittal
 - 2. Revise and Re-submit – requires resubmittal
 - 3. Rejected – requires resubmittal
 - 4. Submit Specific Item – requires resubmittal
- C. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.5 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial progress schedule in duplicate within 15 days after date established in Notice of Award for Engineer review. Submit progress schedule no later than Preconstruction Conference.
- B. Revise and resubmit with each Application for Payment, identifying changes since previous version.
- C. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
- D. Indicate estimated percentage of completion for each item of Work at each submission.
- E. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates.

1.6 PROPOSED PRODUCTS LIST

- A. Within 15 days after date of Notice to Proceed, compile and submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

- C. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

1.7 SHOP DRAWINGS

- A. All shop drawings shall be accompanied by a written statement noting all deviations from the governing technical specifications and/or drawing and shall be referenced to the appropriate paragraph of the section or page of the drawing. If there are no deviations, the statement shall be noted as such. Any submittal not accompanied by such a statement will be returned for resubmittal.
- B. Shop drawings are required for all mechanical installations. These drawings shall show adequate dimensions to review submittals for fit.
- C. After review distribute in accordance with Article on Procedures above and for Record Documents described in Section 01700 - Contract Close-out.

1.8 PRODUCT DATA

- A. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.
- B. After review, distribute in accordance with Article on Procedures above and provide copies for Record Documents described in Section 01700 - Contract Closeout.
- C. Indicate product characteristics that vary from these Specifications.

1.9 SAMPLES

- A. Submit samples when requested in individual sections or as requested by the Engineer.
- B. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- C. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Owner's selection.
- D. Include identification on each sample, with full Project information.

- E. Submit the number or samples specified in individual specification Sections; one of which will be retained by Engineer.
- F. Reviewed samples which may be used in the Work are indicated in individual specification Sections.

1.10 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification Sections or as requested by Engineer, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.
- B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.11 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification Sections, submit manufacturers' certificate to Engineer for review, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.

1.12 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.
- B. Deliver to project site; obtain receipt prior to final payment.

1.13 SUBMITTAL LIMITS

- A. Two submittals will be permitted for each item in this section at no cost to the Contractor. The two submittals include one initial submittal and one resubmittal.
- B. All submittals requiring a third review by the Engineer shall be considered unresponsive and the Owner will charge the Contractor on a Time and Materials basis for the third and all subsequent reviews and all related administrative costs not to exceed \$1,000.00 for each resubmittal.

- C. All submittals, unless noted otherwise in the Contract Documents, shall be submitted within sixty (60) days from Notice to Proceed. Those items requiring resubmittal shall be submitted within thirty (30) days from date of return to Contractor.

PART 2 - PRODUCTS

2.1 WEB-BASED CLOUD CONSTRUCTION ADMINISTRATION SOFTWARE

- A. A web-based Cloud Construction Administration Software (Software) will be used throughout the construction process. The Engineer has not received, provided, or solicited quotes for various software providers. Contractor's indicate the price is quite variable between software providers.
- B. Construction Systems Shall be:
 - 1. AEC-Sync/Newforma Project Cloud
 - 2. Procore Cloud-Based Construction Software
 - 3. EADOC
 - 4. Approved Equivalent
- C. The items below provide a general list of features required of the Web-based Cloud Construction Administration Software:
 - 1. 100 percent web-based cloud with unlimited users interface – no client software required, accessible from any internet connected device)
 - 2. Auditing – records for all actions performed on each document with a time stamp and user details
 - 3. Process Flow and Project Team Setup – defined organizational structure
 - 4. Customizable – add fields or completely new documents (submittal transmittals)
 - 5. Central Repository for drawings, specification, schedules, submittals, RFI's, and Change Order, or any other custom document category
 - 6. Print or exportable to PDF or similar file
 - 7. Attach or upload any file type (PDF, JPEG, CAD, DWG, DWFX)
 - 8. Reporting logs for Submittal
 - 9. Collaborative Review of submittals – comments from several users incorporated on one electronic file

10. Email Notifications and alerts for outstanding documents
11. Document Reporting and History
12. Automatic Workflow Process
13. Complete hosted solution with 24-hour, seven days a week access, redundant servers, daily tape backup.

PART 3 - EXECUTION

Not used.

END OF SECTION

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SECTION 01300 - 10

SUBMITTALS

SECTION 01400 QUALITY CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Quality Assurance/Control of Installation
- B. References
- C. Field Samples
- D. Construction Observation and Pressure Testing
- E. Special Inspection and Testing Laboratory Services
- F. Manufacturer Field Services and Reports

1.2 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce workmanship of specified quality.
- F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.
- G. Verify that field measurements are as indicated on Shop Drawings or as instructed by the Manufacturer.

1.3 REFERENCES

- A. Refer to Section 01090.

1.4 FIELD SAMPLES

- A. Install field samples at the site as required by individual specifications sections for review.
- B. Acceptable samples represent a quality level for the Work.
- C. Where field sample is specified in individual sections to be removed, clear area after field sample has been accepted by Engineer.

1.5 CONSTRUCTION OBSERVATION AND PRESSURE TESTING

- A. The Owner shall provide observation during construction. Contractor shall cooperate with the observer.
- B. The Contractor shall provide the equipment and manpower to conduct all acceptance (leak, pressure, etc.) tests on underground utilities as required in the Specifications.

1.6 SPECIAL INSPECTION AND TESTING LABORATORY SERVICES

- A. Contractor shall retain services of an independent firm to perform special inspecting and testing.
- B. The independent firm will perform tests and other services specified in individual specification sections and as required by the drawings and the International Building Code Section 1701.
- C. Reports will be submitted by the independent firm to the Contractor, Building Official, and Engineer/Owner indicating observations and compliance or non-compliance with Contract documents.
- D. Concrete test reports shall show time and date samples were taken, specific location of concrete placement, slump, air content, ambient air temperature, concrete temperature, date received by lab, field data submitted by, mix number, delivery ticket number, specified strength requirement, 1-7 day break, 2-28 day breaks, any field cylinder breaks as requested by Special Inspector or Engineer, day projected high and low temperatures and weather conditions.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, and assistance as requested.
 - 1. Notify Engineer and independent firm 24 hours prior to expected time for operations requiring services or observation.
- F. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm, unless otherwise approved by the Engineer.
- G. Special Inspections: In addition to the testing specified herein, the Contractor shall employ one or more special inspectors who will provide inspections during construction on the following types of work:

1. Concrete: During the taking of test specimens and placing of reinforced concrete and pneumatically placed concrete. Non-structural slabs on grade and site work concrete fully supported on earth do not require special inspection.
 2. Bolts Installed in Concrete and Masonry: During installation of bolts and placing of concrete around such bolts as indicated.
 3. Reinforcing Steel: During placing of reinforced steel, for all concrete required to have special inspection by Item No. 1. The Special Inspector need not be present during entire reinforcing steel-placing operations, provided he has inspected for conformance with the approved plans, prior to the closing of forms and final inspection of forms prior to the delivery of concrete to the jobsite.
 4. Welding: All structural welding, including welding of reinforcing steel as indicated.
 5. High-Strength Bolting: During bolt installations and tightening operations. The Special Inspector need not be present during the entire installation and tightening for load indicator bolts, provided he has:
 - a. Inspected the surfaces and bolt type for conformance to plans, specifications, and shipping certification prior to start of bolting.
 - b. Observed initial bolting operation for proper sequencing.
 - c. And will, upon completion of all bolting, verify visually all connections.
 6. Special Grading, Excavation, and Filling: During earthwork excavations, grading and filling operations.
- H. Approved Fabricator Shop Certificate: Special inspection per IBC Section 1701 shall not be required where the work is done on the premises of a fabricator registered and approved by the Building Official to perform such work without inspection. Provide a certificate from the Building Official that shows the shop approval.
- I. Non-Approved Fabricator Special Inspection: The Contractor shall reimburse the Owner for the costs incurred for special inspection of fabrication in a non-approved shop.

1.7 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, test, adjust and balance of equipment, as applicable, and to initiate instructions when necessary.
- B. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Submit report within 15 days of observation to Engineer for review.

SECTION 01400 - 3

QUALITY CONTROL

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01400 - 4

QUALITY CONTROL

**SECTION 01500
FACILITIES AND TEMPORARY CONTROLS**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Site Access and Staging
- B. Temporary Utilities: water, electricity and sanitary facilities
- C. Temporary Controls: barriers, enclosures and fencing, protection of the Work, and water control
- D. Construction Facilities: Access roads and parking
- E. Survey Control

1.2 SITE ACCESS AND STAGING

- A. Entire existing site is available for Contractor use.

1.3 TEMPORARY WATER SERVICE

- A. Contractor shall provide, maintain, and pay for suitable quality water required for construction operations.

1.4 TEMPORARY SANITARY FACILITIES

- A. Contractor shall provide and maintain required facilities and enclosures.

1.5 TEMPORARY ELECTRICITY

- A. Contractor shall provide, maintain, and pay for temporary electricity as needed for construction.

1.6 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to allow for Owner's use of site, to protect public safety, and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide protection for plant life designated to remain. Replace damaged plants.
- C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

SECTION 01500 - 1 FACILITIES AND TEMPORARY CONTROLS

1.7 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment as needed.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion and puddling.
- C. Contractor shall follow BMPs for dewatering activities. Contractor shall not degrade adjacent surface water due to dewatering operations.

1.8 DUST CONTROL

- A. This item shall consist of furnishing and applying POTABLE water required in construction and for dust control, in accordance with the requirements of these specifications.
- B. Water, when required, shall be applied at the locations and in the amounts required to properly compact the work. An adequate water supply shall be provided by the Contractor. The equipment used for watering shall be of ample capacity and of such design as to assure uniform application of water in the amounts required.
- C. If required, watering shall be done at times when evaporation loss will be at a minimum, when possible.
- D. In watering of subgrades, the Engineer may direct the Contractor to apply water in such quantities that the subgrade shall be compacted at a moisture content in excess of "optimum moisture." In no case will the Contractor be required to apply water in excess of three percent (3%) of optimum moisture.
- E. The Contractor shall also apply water during the course of the work to control dust, maintaining all embankment and base courses in a damp condition.
- F. The Contractor shall provide sufficient equipment to apply water as directed for controlling dust caused by construction activities. If dusty conditions continue to exist due to insufficient or inadequate watering practices or lack of watering equipment, it shall cause the closing down of those operations affected until remedied. Watering shall be done on Saturdays, Sundays, and Holidays at the same frequency and amounts as specified for work days at the Contractor's expense.

1.9 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize amount of bare soil exposed at one time.
- C. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosion of surface silts or

SECTION 01500 - 2 FACILITIES AND TEMPORARY CONTROLS

clays.

- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.10 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
- B. Equipment and fuel storage shall be kept secured. Waste oil and waste fluids shall not be stored or changed at any construction site.
- C. Spills of hazardous or toxic materials shall be promptly reported to the Idaho Department of Environmental Quality (IDEQ). Contractor shall take emergency measures to limit the amount of the releases at Contractor's own expense.

1.11 SECURITY

- A. Provide security and facilities to protect work from unauthorized entry, vandalism or theft.

1.12 NOISE CONTROL

- A. Construction involving noisy operations, including starting and warming up of equipment, shall be restricted to the hours between 8:00 a.m. and 5:00 p.m. on weekdays.
- B. Notification of special circumstances or emergency conditions that require work beyond the hours specified above shall be provided as follows:
 - 1. The Contractor shall notify the Engineer 72 hours and Owner 48 hours in advance of any proposed extended work hours for preauthorization. Notification shall include a written request for authorization to perform work specified and the circumstances that warrant this request. This notification shall include any additional measures to mitigate noise generated by this construction activity if deemed necessary by the Engineer.
 - 2. If an emergency situation occurs that warrants extended hours, the Contractor shall notify the Engineer immediately upon determining the need for this work.

1.13 TREE AND PLANT PROTECTION

- A. Cultivated Areas and other Surface Improvements: All landscaped areas and other surface improvements which are damaged by actions of the Contractor shall be restored to a condition equal to or better than it was prior to construction. Areas shall not be cleared until related construction activities require the Work.

SECTION 01500 - 3 FACILITIES AND TEMPORARY CONTROLS

1.14 PROTECTION OF INSTALLED WORK

- A. Protect installed work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

1.15 ACCESS ROADS

- A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area.
- B. Extend and relocate as work progress requires. Provide detours necessary for impeded traffic flow in excess of two hours.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide and maintain access for emergency vehicles.
- E. Provide means of removing mud from vehicle wheels before entering streets.

1.16 PARKING

- A. Do not allow construction personnel to park in any way which may affect the access of emergency vehicles or Owner's personnel.

1.17 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove waste materials, debris, and rubbish from site periodically and dispose off-site in approved solid waste facilities at no additional cost to owner.
- C. Provide necessary containment and clean-up of all hazardous/dangerous materials on-site that result from Contractor's actions.
- D. Dispose of all hazardous/dangerous waste in approved hazardous waste facilities that result from Contractor's actions.

1.18 FIELD OFFICES AND SHEDS

- A. Provide weather proof enclosure, shed, or field office to house Contract Documents, Record Drawings, permits, and any other documents required to be onsite during construction.

SECTION 01500 - 4 FACILITIES AND TEMPORARY CONTROLS

1.19 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Substantial Completion.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01500 - 5 FACILITIES AND TEMPORARY CONTROLS

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SECTION 01500 - 6 FACILITIES AND TEMPORARY CONTROLS

**SECTION 01600
MATERIALS AND EQUIPMENT**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Products
- B. Transportation and Handling
- C. Storage and Protection
- D. Product Options
- E. Substitutions

1.2 PRODUCTS

- A. Products: new unused material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse, if specified.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents or as approved by the Engineer.
- C. Provide interchangeable components of the same manufacturer, for similar components.

1.3 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly review shipments to assure that products comply with requirements, quantities are correct, and products are undamaged. Replace damaged products at no additional cost to the Owner.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather tight, climate controlled enclosures.
- B. For exterior storage of fabricated products, place on sloped supports, above ground.
- C. Provide off site storage and protection when site does not permit on site storage or

protection.

- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation and degradation of products.
- E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- G. Arrange storage of products to permit access for review. Periodically review to assure products are undamaged and are maintained under specified conditions.

1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

1.6 SUBSTITUTIONS

- A. Engineer will consider requests for Substitutions only within 15 days after date of Owner and Contractor Agreement.
- B. Requests must also meet the requirements set forth in the General Conditions and specific specification sections.
- C. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- D. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- E. A request constitutes a representation that the Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the Substitution as for the specified product.
 - 3. Has reviewed installation for fit with existing or new components and construction constraints.
 - 4. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 5. Waives claims for additional costs or time extension which may subsequently

become apparent.

6. Will reimburse Owner for review or redesign services associated with re approval by authorities.
- F. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- G. Substitution Submittal Procedure:
 1. Submit digital copy of Request for Substitution for consideration. Limit each request to one (1) proposed Substitution.
 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
 3. The Engineer will notify Contractor, in writing, of decision to accept or reject request.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

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SECTION 01600 - 4

**MATERIALS AND
EQUIPMENT**

**SECTION 01650
STARTING OF SYSTEMS**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Initial Starting and Testing of Systems
- B. Owner Training
- C. Acceptance Testing
- D. Commissioning of Systems

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 GENERAL

- A. Throughout the testing, demonstration, training and commissioning activities discussed in this section, Contractor and Contractor's subcontractors (as deemed appropriate by Owner and Engineer) shall be present for repair, correction of incomplete work, alternation, or unscheduled/unforeseen adjustments to any equipment or systems.
- B. Provide all labor, supervision, utilities, chemicals, maintenance, equipment, vehicles, or any other item necessary to proceed with the steps discussed in this section and other applicable portions of the Contract Documents.

3.2 INITIAL STARTING AND TESTING OF SYSTEMS

- A. Coordinate schedule for initial starting and testing of all equipment and systems in the project. Prepare and submit a separate detailed schedule for activities, including dates for activities, personnel involved, contact information for vendors, and other pertinent information.
- B. Notify Owner and Engineer ten (10) days prior to Contractor's initial starting and testing of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions that may cause damage.
- D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

- E. Verify wiring and support components for equipment are complete and tested.
- F. Verify all instrumentation and controls are complete and have undergone testing in accordance with Division 16 requirements. The Contractor is responsible for performing a loop check on all installed wiring. The Contractor shall make a checklist confirming that each loop check has been performed per DIVISION 16 requirements. No further testing, programming or commissioning activities can be completed until all loop checks have been completed.
- G. Execute initial starting and testing under supervision of responsible manufacturer's representative and in accordance with manufacturers' instructions. Minimum time on-site and number of trips to site by manufacturers representative are shown in **Table 1** included in this Specification.
- H. When specified in individual specification sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to initial starting and testing, and to supervise placing equipment or system in operation.
- I. Demonstrate operation of all equipment and systems to Engineer and Owner's personnel adequately prior to date of Substantial Completion. Contractor shall schedule component startups accordingly to meet the specified Contract Times. Contractor shall provide 24-hours continuous run-time (or longer as required in individual specification sections) as part of the initial start-up and testing.
- J. Contractor shall provide temporary pump/piping, where necessary, to replicate design flows for the purpose of providing flow to system facilities for testing. Contractor is required to provide all equipment, fuel, controls, and necessary piping for start-up and testing purposes.
- K. Upon completion of Initial Starting and Testing of Systems, submit a certified report to Engineer (using the form inserted at the end of this specification and supplemented with manufacturer's checklists and forms) that the requirements are complete and that system is ready for programming and subsequent acceptance testing. Certificate shall be signed by Contractor and Manufacturer/Supplier.
- L. Once all systems have been started, Contractor shall issue a letter to Engineer titled, "Request for Notice of Completed Installation". Engineer shall review the Contractor's request, and if all obligations have been fulfilled to the satisfaction of the Engineer, the Engineer shall issue a letter to the Contractor and Owner titled: "Notice of Completed Installation". Issuance of "Notice of Completed Installation" shall commence the beginning of "Operator Training" period.

3.3 OPERATOR TRAINING

- A. Operator training shall not commence until "Initial Starting and Testing of Systems" is complete, all systems are proven to operate satisfactorily, and the Engineer has issued the "Notice of Completed Installation". Contractor shall coordinate the training day and time with the Owner for an occasion when Owner's operating personnel are available.

Notify Owner and Engineer seven days prior to intended start date of training. Contractor shall make every effort to provide training on Tuesdays, Wednesdays and Thursdays.

- B. Utilize operation and maintenance manuals as basis for instruction. A complete draft copy of the Equipment Operation and Maintenance (O&M) Manuals (see Section 01730) shall be available for each of the Owner's operating personnel who attend the training. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance. Operator training shall include the use of slides, videos, literature, diagrams, and/or oral presentations as necessary to present comprehensive, detailed instruction of operation and maintenance requirements of the equipment.
- C. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- D. The Owner/Engineer may record the training sessions. The recording produced shall be the sole property of the Owner and Engineer.
- E. The equipment representative shall provide a minimum number of trips with minimum duration of onsite services each trip as shown in **Table 1** included with this Specification. Training may be completed during the same trip to site as Initial Startup if identified as allowed in **Table 1**.
- F. Training shall be divided into two parts (Classroom and Field Training). Classroom training shall include PowerpointTM (overhead projection) training materials and shall utilize the preliminary operation and maintenance manual as the basis of instruction. Upon satisfactory completion of the classroom training, continue training with a field training session utilizing the installed equipment. Equipment shall be run in all available control modules and sequences of operation.
- G. Owner training sessions (classroom and field) shall be provided during those trips as shown in **Table 1**. A preliminary Training Outline is included at the end of this section for the Contractor's reference.
- H. Upon completion of "Operator Training", submit a certified report to Engineer (using the form inserted at the end of this specification and supplemented with manufacturer's checklists and forms) that the requirements are complete and that system is ready for the start of the "Programming Period."

3.4 ACCEPTANCE TESTING OF SYSTEMS

- A. Following Operator Training, "Acceptance Testing of Systems" may begin.
- B. Notify Owner and Engineer seven days prior to intended start date of Acceptance Testing of Systems.
- C. Duration of Acceptance Testing Period shall be a minimum of 14 calendar days, unless a longer period or more restrictive performance testing requirements are specified in a separate technical specification.

1. Time of beginning and ending of any Acceptance Testing will be agreed upon by Contractor, Owner, and Engineer in advance of initiating Demonstration Period.
 2. Length of Acceptance Testing other than specified will be agreed upon by Contractor, Owner, and Engineer in advance of initiating Acceptance Testing.
 3. Contractor is required to provide all equipment, fuel, controls, and necessary piping for start-up and testing purposes.
- D. Demonstrate operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled times, at equipment location. Acceptance Testing period should be organized to provide a clear, concise summary of the equipment operation and maintenance.
- E. Demonstrate the functional integrity of the mechanical, electrical, and control interfaces of the respective equipment and components comprising the facility or system.
- F. If, during Acceptance Testing, the aggregate amount of time used for repair, correction of incomplete work, alternation, or unscheduled adjustments to any equipment or systems that render the affected equipment or system inoperative exceeds 4 hours of the scheduled Acceptance Testing period, the demonstration of functional integrity will be deemed to have failed. In the event of failure, a new Acceptance Testing Period will recommence after correction of the cause of failure. The new Acceptance Testing Period shall have the same requirements and duration as the Acceptance Testing Period previously conducted.
- G. Conduct the demonstration of functional integrity under full operational conditions.
- H. Owner will provide operational personnel to provide process decisions affecting system performance. Owner's assistance will only be available for process decisions. Contractor will perform all other functions, including, but not limited to, equipment operation and maintenance until successful completion of the Acceptance Testing.
- I. Owner and Engineer reserve the right to simulate operational variables, equipment failures, routine maintenance scenarios, etc. to verify the functional integrity of automatic and manual backup systems and alternate operating modes.
- J. Provide knowledgeable personnel to answer Owner's questions throughout the Acceptance Testing Period.
- K. Provide field instruction on systems and respond to any system problems or failures that may occur.
- L. Upon completion of Acceptance Testing, submit a certified report to Engineer (using the form inserted at the end of this specification and supplemented with manufacturer's checklists and forms) that the requirements are complete and that system is ready for Operator Training. Certificate shall be signed by Contractor and Manufacturer/Supplier.

3.5 COMMISSIONING OF SYSTEMS

- A. When adequate Training, and successful Acceptance Testing is completed to the satisfaction of the Owner and Engineer, the systems may be Commissioned.
- B. Commissioning is defined as full integration of the equipment, including all electrical, controls, instrumentation, and all other support systems necessary for operation of the entire system as designed.
- C. Owner reserves the right to withhold payment on individual equipment items until such time as Commissioning may commence.
- D. Submit a certified report to Engineer (using the form inserted at the end of this specification and supplemented with manufacturer's checklists and forms) that the requirements are complete and that system is fully Commissioned. Certificate shall be signed by Contractor and Manufacturer/ Supplier.

Table 1 – Manufacturer's Representative Minimum Onsite Requirements for Startup and Training

Reference Technical Specification Section	Supervision, Inspection, and Startup for Equipment (Minimum Number 8-hour person-days) ^(a)	Classroom and Field Training (Minimum Number person-hours of training)	Number of Trips to Site ^(b)
SECTION 11103 & 11111- PUMP	0.5	2	1
HVAC COMMISSIONING	0.5	2	1
DIVISION 16 - ELECTRICAL SYSTEMS	PER DIV 16	PER DIV 16	PER DIV 16

^(a) Day shall be 8 hours onsite. If combined to a single trip, "days" for start-up shall not be considered for "days" for training.

^(b) Number of trips shall be per each Bid Schedule

CONTRACTOR & MANUFACTURER/ SUPPLIER CERTIFICATE OF STARTING OF SYSTEM

The following certificate shall be completed for each equipment item or system in accordance with Specification 01650 - Starting of Systems.

Project Name	_____	Equip Item/ Tag	_____
Owner	_____	Specification No.	_____
Engineer	_____	Serial No.	_____
Contractor	_____		

Equip Mfg./ Supplier Start-up Representative and Contact Information:

Initial Starting and Testing of Systems (01650 - 3.2)

Item No.	Description	Date Completed
1	(3.2.B) Notify Owner and Engineer seven days prior to initial starting and testing	
2	(3.2.C) Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions that may cause damage	
3	(3.2.D) Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer	
4	(3.2.E) Verify wiring and support components for equipment are complete and tested.	
5	(3.2.F) Verify all instrumentation and controls are complete and have undergone testing in accordance with Division 16 requirements	
6	(3.2.G) Execute initial starting and testing under supervision of responsible manufacturer's representative and in accordance with manufacturers' instructions	
7	(3.2.H) Provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to initial starting and testing, and to supervise placing equipment or system in operation	
8	(3.2.I) Submit a certified report to Engineer that the requirements are complete and that system is ready for Demonstration	

Observations/ Recommendations/ Comments:

MANUFACTURER/ SUPPLIER SIGNATURE

DATE

CONTRACTOR SIGNATURE

DATE

Operator/Owner Training (01650 - 3.3)

Item No.	Description	Date Completed
1	(3.3.B) Provide a complete draft copy of the Equipment Operation and Maintenance (O&M) Manuals for each of the Owner's operating personnel who attend the training	
2	(3.3.B) Review contents of O&M manual with Owner's operating personnel in detail to explain all aspects of operation and maintenance	
3	(3.3.B) Include the use of slides, videos, literature, diagrams, and/or oral presentations as necessary to present comprehensive, detailed instruction of operation and maintenance requirements of the equipment	
4	(3.3.C) Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction	
5	(3.3.F) Upon satisfactory completion of the classroom training, continue training with a field training session utilizing the installed equipment. Equipment shall be run in all available control modes and sequences of operation.	
6	(3.3.G) Submit a certified report to Engineer that the requirements are complete and that system is ready for Commissioning	

Observations/ Recommendations/ Comments:

MANUFACTURER/ SUPPLIER SIGNATURE	DATE
CONTRACTOR SIGNATURE	DATE

Acceptance Testing of Systems (01650 - 3.5)

Item No.	Description	Date Completed
1	(3.5.A) Notify Owner and Engineer seven days prior to demonstration	
2	(3.5.D) Demonstrate operation, control, adjustment, and shutdown	
3	(3.5.D) Demonstrate trouble shooting, servicing, maintenance	
4	(3.5.E) Demonstrate the functional integrity of the mechanical, electrical, and control interfaces of the respective equipment and components comprising the facility or system	
5	(3.5.G) Conduct the demonstration of functional integrity under full operational conditions	
6	(3.5.J) Provide knowledgeable personnel to answer Owner's questions throughout the Demonstration Period	
7	(3.5.K) Provide field instruction on systems and respond to any system problems or failures that may occur	
8	(3.5.L) Submit a certified report to Engineer that the requirements are complete and that system is ready for Operator Training	

Observations/ Recommendations/ Comments:

MANUFACTURER/ SUPPLIER SIGNATURE	DATE
CONTRACTOR SIGNATURE	DATE

Commissioning of Systems (01650 - 3.6)

Item No.	Description	Date Completed
1	Certify that system is fully integrated, including all electrical, controls, instrumentation, and all other support systems necessary for operation of the entire system as designed	
2	(3.6.D) Submit a certified report to Engineer that all preceeding requirements have been completed and that the system is ready for commissioning by Owner.	

Observations/ Recommendations/ Comments:

Certification by Manufacturer/Supplier and Contractor

MANUFACTURER/ SUPPLIER SIGNATURE

DATE

CONTRACTOR SIGNATURE

DATE

Acceptance by Owner

OWNER'S SIGNATURE

DATE

TRAINING OUTLINE

Below is a basic training outline that is to be provided with the training listed in Section 01650 Table 1: Manufacturer's Representative Minimum Onsite Requirements for Startup and Training.

A. General Description

A basic description of the overall equipment system function and operation. Identify the major components of the equipment system. (i.e., motor, drive, pump and controls). Provide a general description of equipment functional capacities (i.e., pumping capacity and maximum / minimum ranges and reverse operation if applicable, etc.).

B. Equipment System Components

Classroom: Identify by name and location of components that make up the equipment system. In the classroom use photos or videos that clearly identify the components. Provide a functional description of what each component does in the operation of the equipment system. (i.e., Proximity switch provides feedback for rotation of equipment by sensing a metal bar passing through the switch magnetic field). Describe each components inputs, outputs, normal and abnormal conditions, safety issues, routine maintenance and disassemble / reassemble of the component.

Field training: Repeat the classroom information in the field clearly identifying components by touching or pointing to them.

C. Equipment System Function & Operation

Classroom: Describe how each equipment system component contributes to the function and operation of the equipment system. Discuss equipment system checkout prior to operation, equipment startup, routine operation, abnormal operation, remote operation, equipment shut down and emergency conditions. Provide methods to obtain the most efficient equipment system operation. Troubleshooting abnormal operating conditions and typical solutions. Alarm conditions shall be describe as to the causes, solutions and effects on the equipment system.

Field Training: Repeat the classroom information applying it to the installed equipment. Direct the Owners personnel to the step by step procedures operate the equipment system properly. Perform normal operational checks to verify proper operation. Identify conditions and indications of improper operation. Provide training on how the automatic operating controls function and adjustments available to the operators.

D. Equipment System Maintenance

Classroom: Describe and discuss the routine and preventative maintenance activities procedures. Use the Preliminary O&M manual to identify the lubricants needed and their proper application. Use video or pictures to provide classroom training on equipment disassemble and reassemble for the replacement of components. Discuss the equipment system spare parts needed and the sources for the spare parts.

Field training: Review the classroom information including disassemble and reassemble of equipment system and its components. Disassemble and reassemble equipment, which will not void the manufacturers warrantee.

E. Equipment System Safety

Classroom: Identify all safety issues with the equipment system: mechanical, electrical, chemical and any other safety items. Provide step by step procedures to control the safety hazards.

Field training: Review the classroom information for the equipment system mechanical, electrical, chemical and other safety items. Provide hands on training of step by step safety procedures.

END OF SECTION

**SECTION 01700
CONTRACT CLOSEOUT**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Closeout Procedures
- B. Final Cleaning
- C. Adjusting
- D. Project Record Documents
- E. Warranties
- F. Spare Parts and Maintenance Materials

1.2 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, work has been reviewed, and that work is complete in accordance with Contract Documents and ready for Engineer's review.
- B. Provide submittals to Engineer that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 FINAL CLEANING

- A. Execute final cleaning prior to final review.
- B. Clean equipment and fixtures to a sanitary condition.
- C. Clean debris from drainage systems.
- D. Clean site; sweep paved surfaces, rake clean landscaped surfaces.
- E. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.4 SURFACE RESTORATION:

- A. Restore any damaged surface to a condition equal to or better than it was prior to construction.

1.5 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

- B. Adjust all products to assure smooth and proper fit.

1.6 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set of the following record documents, stored separate from those used for construction; record actual revisions to the work:
 - 1. Contract Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Change Orders and other Modifications to the Contract
 - 5. Reviewed Shop Drawings, Product Data, and Samples
- B. Record information concurrent with construction progress.
- C. Specifications: Legibly mark and record at each product section description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number
 - 2. Product substitutions or alternates utilized
 - 3. Changes made by Addenda and Modifications
- D. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Measured locations of utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
 - 3. Field changes of dimension and detail.
 - 4. Details not on original Contract Drawings.
- E. Draw a line through the Engineer title block and seal on all documents submitted as Record Drawings. Provide names and dates recording individuals.
- F. Submit documents to Engineer with claim for final Application for Payment.

1.7 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.

- B. Deliver to project site or to site designated by Owner.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

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SECTION 01730
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Format and Content of Manuals
- B. Instruction of Owner's Personnel
- C. Schedule of Submittals

1.2 QUALITY ASSURANCE

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.3 FORMAT

- A. Prepare data in the form of a reference manual.
- B. Binders: Commercial quality, 8-1/2 x 11, three D side ring binders with durable plastic covers; 2-inch maximum ring size. When multiple binders are used, correlate data into related, consistent groupings.
- C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- D. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- E. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- F. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.4 CONTENTS

- A. Part 3: Project documents and certificates, including the following:
 - 1. Shop Drawings and Product Data
 - 2. Certificates
 - 3. Photocopies of Warranties (and Bonds)

SECTION 01730 - 1 OPERATION AND MAINTENANCE DATA

1.5 CONTENTS – EACH VOLUME

- A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Engineer, Subconsultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Operation and Maintenance Instructions: arranged by system and subdivided by components. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following where applicable:
 - 1. Significant Design Criteria
 - 2. List of Equipment
 - 3. Parts List for Each Component
 - 4. Operating Instructions
 - 5. Maintenance Instructions for Equipment and Systems
 - 6. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents
- E. Drawings: product drawings including the following:
 - 1. Shop Drawings and Product Data.
 - 2. Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- F. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01400.
- G. Warranties: Bind in copy of each
- H. Bonds: Bind in photocopy of each

1.6 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete

SECTION 01730 - 2 OPERATION AND MAINTENANCE DATA

nomenclature and model number of replaceable parts.

- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications by label machine.
- C. Include color coded wiring diagrams, as installed.
- D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions; cleaning and coating; etc.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Provide control diagrams by controls manufacturer as installed.
- K. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- L. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.
- M. Provide as a minimum manufacturer's operation and maintenance manual for:
 - 1. Pump and Motor
 - 2. Control Valves (electronic, pressure relief, air vac/relief, isolation, etc.)
 - 3. Electrical Power Generator
 - 4. MCC and Electrical Control Equipment
 - 5. HVAC
 - 6. Paint Systems
 - 7. Architectural Specialties

SECTION 01730 - 3 OPERATION AND MAINTENANCE DATA

1.7 INSTRUCTION OF OWNER PERSONNEL

- A. Refer to Section 01650 for Owner Training.
- B. Use operation and maintenance manuals as basis for instruction.

1.8 SUBMITTALS

- A. Submit per Section 01300.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01730 - 4 OPERATION AND MAINTENANCE DATA

**SECTION 02055
SOIL MATERIALS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Soil and subsoil materials referenced by other sections for fill and grading purposes
- B. Subsoil Materials
- C. Topsoil Materials

1.2 RELATED SECTIONS

- A. City of Moscow Standards, Appendix A
- B. Geotechnical Report, Appendix B
- C. Section 01300 – Submittals
- D. Section 01400 - Quality Control
- E. Division 2 – All Sections

1.3 REFERENCES

- A. AASHTO T 310: In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.
- B. AASHTO T-180 - Moisture-Density Relations of Soils Using a 10-lb Rammer and eighteen (18) inch Drop
- C. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- D. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures in place by Nuclear Methods (Shallow Depth)
- E. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 Kn-m/m³))
- F. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³. (2,700 kN-m/m³))

- G. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Samples: Submit, in airtight containers, 45 lb. (20 kg) sample of each type of imported trench backfill to testing laboratory.
- C. Materials Source: Submit name of imported materials suppliers. Provide materials from same source throughout the work. Change of source requires Engineer's approval.
- D. Furnish each material from a single source throughout the Work.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

- A. Indian Hills:
 - 1. Topsoil Type S1: Excavated material, up to 12 inches below soil surface, not suitable for reuse as fill material.
 - 2. Subsoil Type S2: Excavated material below topsoil Type S1. Documented as Silt (ML), dark brown, very soft to soft, and moist to wet. Reference Geotechnical report for additional information
 - 3. Subsoil Type S3: Excavated material below topsoil Type S1. Documented as Clay (CL), grayish brown, firm to stiff, and moist. Reference Geotechnical report for additional information
- B. Ponderosa:
 - 1. Topsoil Type S1: Excavated material, up to 12 inches below soil surface, not suitable for reuse as fill material.
 - 2. Subsoil Type S2: Excavated material below topsoil Type S1. Documented as Clay with a trace of gravel (CL), grayish brown, soft to stiff, and moist to wet. Reference Geotechnical report for additional information
 - 3. Subsoil Type S3: Excavated material below topsoil Type S1. Documented as Clay (CL), grayish brown, stiff and moist. Reference Geotechnical report for additional information

2.1 SOURCE QUALITY CONTROL

- A. Inspection and testing will be performed under provisions of Section 01400.
- B. Testing and Analysis of Subsoil Material: Perform in accordance with AASHTO T-180, ASTM D1557, ASTM D698.
- C. Testing and Analysis of Topsoil Material: Analyze to determine percentage of nitrogen, phosphorus, potash, soluble salt, organic matter, and pH.
- D. If tests indicate materials do not meet specified requirements, change material and retest at no cost to Owner.

PART 3 EXECUTION

3.1 STOCKPILING

- A. Stockpile materials on site within areas designated on the Contract Documents, or coordinate with Owner for an approved location.
- B. Stockpile in sufficient quantities to meet project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent intermixing of soil types or contamination.
- D. Stockpile 8 feet high maximum.
- E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.2 STOCKPILE CLEANUP

- A. Remove stockpile(s) and leave area in a clean and neat condition. Grade site surface to prevent freestanding surface water. Restore area to original condition.
- B. Excess soil materials shall be disposed of off-site by Contractor at no additional expense to Owner.

END OF SECTION

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SECTION 02060
AGGREGATE MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This Section includes a range of coarse and fine aggregate materials intended to be referenced by other sections, generally for fill and grading purposes. Materials are indicated by "Type" to assist in referencing from other sections and in Drawing notes.
- B. Coarse aggregate materials
- C. Fine aggregate materials

1.2 RELATED SECTIONS

- A. City of Moscow Standards, Appendix A
- B. Geotechnical Report, Appendix B
- C. Section 01300 – Submittals
- D. Section 01400 - Quality Assurance and Quality Control
- E. Division 2 – All Sections

1.3 REFERENCES

- A. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
- B. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-pound) Rammer and a 457-mm (18-inch) Drop.
- C. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- D. ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction
- E. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 foot pound-force/foot³ (600 kN-m/m³))
- F. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 foot pound-force/foot³ (2,700 kN-m/m³)).

- G. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- H. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- I. WAQTC – Western Alliance for Quality Transportation Construction

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Samples: Submit, in airtight containers, 45 pound (20 kg) sample of each type of imported trench backfill to testing laboratory.
- C. Materials Source: Submit name of imported materials suppliers. Provide materials from same source throughout the work. Change of source requires Engineer's approval.
- D. Furnish each material from a single source throughout the Work.

PART 2 PRODUCTS

2.1 CRUSHED AGGREGATE DESCRIPTION

- A. Product shall be in accordance with City of Moscow Standards
- B. Fine and course fragments of crushed stone or crushed gravel.
- C. May include sand, finely crushed stone, crusher screenings, or similar filler material.
- D. Crushed material consisting of hard, durable particles or fragments of stone free of flat, elongated or soft pieces, dirt, or other objectionable material.
- E. Percent of wear not more than 35, at 500 revolutions.
 - 1. AASHTO 96: Los Angeles Abrasion Test.
- F. Production Requirements:
 - 1. Percentage of fractured particles occurring in the finished product to be uniform and consistent.
 - 2. The percentage of aggregate retained on the No. 4 sieve having at least one fractured face as determined by WACTC TM-1 to be 60 percent for untreated base and 75 percent for four treated base and road mix.

3. Material may require screening and/or washing prior to crushing to eliminate excessive fines. No additional payment will be made for pre-screening or washing.
- G. Test course and fine aggregates for soundness
1. AASHTO T 104: Soundness of Aggregate by use of Sodium Sulfate or Magnesium Sulfate.
 - a. Five cycles using sodium sulfate
 - b. Maximum loss of less than or equal to 12 percent
- H. Incorporate all material passing the No. 4 sieve into the final product unless it is necessary to reduce the amount of this material to meet gradation specifications.

2.2 CRUSHED AGGREGATE MATERIALS

- A. Gradations are listed in the chart below:
1. AASHTO T 2: Sampling Aggregates
 2. AASHTO T 11: Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing
 3. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates

Sieve Size	Nominal Maximum Size			
	Type A1 - ¾" (ISPCW Type I) (Fine Agg.)	Type A2 - 2 ½" (ISPCW Type II) (Coarse Agg.)	Type A3 - 6" (Coarse Agg.)	Type A4 - 2" (Coarse Agg.)
6 inches			100	
4 inches			98 to 100	
3 inches			95 to 100	
2½ inches		100		
2 inches		90 to 100	75 to 100	100
1 inch (38.1 mm)	100	55 to 83	40 to 80	0
¾ inch (19 mm)	90 to 100			
No.4 (4.75 mm)	40 to 65	30 to 60	25 to 60	
No. 8	30 to 50			
No. 30 (600 micro m)		10 to 25		
No. 50				
No. 200	3 to 9	0 to 8	5 to 12	

- B. Allowable percent passing No. 4 sieve may be adjusted within the ranges shown in the table with additional compensation to the contractor.

- C. Portion of fine aggregate passing the No. 200 sieve to be less than 60 percent of that portion passing the No. 40 sieve.
- D. Liquid limit of fine aggregate passing the No. 40 sieve ≤ 25 . Plasticity Index ≤ 6 .
 - 1. AASHTO T 2: Sampling of Aggregates
 - 2. AASHTO T 89: Determining the Liquid Limit of Soils
 - 3. AASHTO T 90: Determining the Plastic Limit and Plasticity Index of Soils
- E. Sand Equivalent ≥ 30 . Sand Equivalent not required if less than 5 percent passing the No. 200 Sieve.
- F. AASHTO T 176: Plastic Fines in Graded Aggregates and Soils by use of the Sand Equivalent Test.
- G. Sand Equivalent test not required if less than 5 percent passing the No. 200 sieve, or aggregate to be used for cement or lime treated base.

2.3 BEDDING DESCRIPTION

- A. If the contractor requests and the Engineer determines suitable bedding is available from excavated material, Type B1 bedding material may be created by screening, sifting, or manually sorting.

2.4 BEDDING MATERIALS

- A. Gradations are listed in the chart below.
 - 1. AASHTO T 2: Sampling Aggregates
 - 2. AASHTO T 11: Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing
 - 3. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates

Sieve Size	Nominal Maximum Size	
	Type B1 - $\frac{3}{4}$ " (ISPWC Type I Bedding)	Type B2 - Sand (ISPWC Type III Bedding)
1 inch (38.1 mm)	100	
$\frac{3}{4}$ inch (19 mm)	80 to 100	
$\frac{3}{8}$ inch (9.5 mm)	20 to 70	
No. 4 (4.75 mm)	5 to 20	100
No. 8	0 to 5	
No. 200	0 to 3	0 to 3

2.5 SOURCE QUALITY CONTROL

- A. Quality Assurance Observation and Testing will be performed under provisions of Section 01400. Contractor is responsible for Quality Control.
- B. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D1557.
- C. Fine Aggregate Material - Testing and Analysis: Perform in accordance ASTM D1557.
- D. If tests indicate materials do not meet specified requirements, change material and retest at no cost to Owner.

PART 3 EXECUTION

3.1 STOCKPILING

- A. Stockpile materials on site or at an approved location.
- B. Stockpile in sufficient quantities to meet project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
- E. Upon removal, do not mix material with native materials.

3.2 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent freestanding surface water.

END OF SECTION

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SECTION 02110 SITE CLEARING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This Section generally includes clearing site of incidental paving and curbs, debris, grass, trees, and other plant life in preparation for site or building excavation and site Work.
- B. Surface debris removal
- C. Stripping construction site of plant life and grass, including root systems to a minimum 6-inch depth.
- D. Removal and disposal of shrubs and grasses
- E. Removal of trees and root systems
- F. Removal of abandoned utilities
- G. Excavating topsoil

1.2 RELATED SECTIONS

- A. City of Moscow Standards, Appendix A
- B. Geotechnical Report, Appendix B
- C. Section 01500 – Construction Facilities and Temporary Controls
- D. Section 02311 – Rough Grading

1.3 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for disposal of debris.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PREPARATION

- A. Verify that existing plant life designated to remain is tagged or identified.

3.2 PROTECTION

- A. Locate, identify, and protect utilities that are designated to remain from damage.
- B. Protect all trees that are not specifically identified to be removed on plans.
- C. Protect plant growth, and features designated to remain, as final landscaping or outside of construction limits.
- D. Retain and protect benchmarks, survey monuments, and existing structures and utilities from damage or displacement.
- E. Protect roads, fences, and other items to remain during construction.
- F. Protect all adjoining property.
- G. Prevent air pollution or dust from becoming a nuisance to the public, to neighbors, and to others performing work on or near the project site. Comply with governing regulations.

3.3 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove trees, brush, and shrubs within construction limits and in areas for which easements have been acquired where identified on plans. Remove stumps and roots completely.
- C. Limit clearing and construction operation to areas required for construction and designated by the ENGINEER and within rights-of-way or easements obtained by the OWNER.

3.4 REMOVAL/STRIPPING

- A. Remove debris and extracted plant life from site. Open burning and burial in trenches is prohibited. Legally dispose of debris and extracted plant life.
- B. Strip all heavy soils, heavy growths of grass, and sod that comprise the organic root-zone and legally dispose of off-site. The depth of stripping will generally be 8 to 24 inches.
- C. Remove all stumps and roots over 4 inches in diameter and matted roots within the limits of grubbing to a minimum depth of 24 inches below existing ground surface. Engineering requirements shall control removal of stumps smaller than 4 inches in diameter under fills, foundations, or any construction in proximity of the stumps.
- D. Dispose of all materials at locations that are in compliance with all Federal, State, and Local Regulations.

- E. Grade areas in which groundwater is encountered to drain.
- F. Remove paving, curbs, and all other surface features to be demolished on plans. Saw cut at right angles to surface.

3.5 OBSTRUCTIONS

- A. Remove and replace fences, fence post, signs, and any structures encountered during construction in accordance with the Drawings and Specifications, or to a condition equal to or better than it was prior to construction.

3.6 CLEANUP

- A. Upon completion of the site work and project, clean the entire work area. Remove all excess excavated material, rocks, boulders, logs, trees, pipe, or debris of any type from the site and dispose at a site acceptable to Federal, State, and Local Regulations.
- B. Hydroseed all disturbed areas in accordance with Section 02930.

END OF SECTION

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SECTION 02300 DRIVEWAYS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Work shall consist of constructing the type(s) of driveway approaches shown in the Plans and in accordance with these Specifications. The widths of the driveway entrances shall be as noted in the Plans.

1.2 REFERENCES

- A. Moscow City Code
- B. City of Moscow Standard Construction Specifications
- C. Idaho Transportation Department – Standard Specifications for Highway Construction (latest edition)
- D. Idaho Transportation Department – Standard Specifications for Highway Construction Supplementals.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials shall meet the requirements of the following sections:
- B. Concrete shall meet the requirements of Moscow Engineering Specification ES-11 CONCRETE.
- C. Reinforcing Steel shall meet the requirements of Moscow Engineering Specification ES-16.6 - Reinforcing Steel.
- D. Aggregate Base shall meet the requirements of Engineering Specification ES-7 CRUSHED ROCK BASE.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Excavation, including disposal, shall be in accordance with ES-4 REMOVALS AND DISPOSALS and ES-5 EARTHWORK of the Moscow Engineering Specifications. It is the contractors' responsibility to obtain an approved dumpsite location for all disposal items.
- B. All existing driveways, curbs and sidewalks and streets shall be neatly saw-cut prior to excavation.

- C. Work shall be accomplished in a manner and method as to minimize the time that driveways will be out of service. The contractor shall notify business at least 24 hours in advance as to when their driveways will be out of service.
- D. All aggregate base shall be furnished and installed in accordance with Engineering Specification ES-7 CRUSHED ROCK BASE. Prior to placing base rock, excavated subgrade shall be graded smooth and compacted to the satisfaction of the Engineer.
- E. Concrete shall be furnished and placed in accordance with Engineering Specification ES-12 CONCRETE CONSTRUCTION REQUIREMENTS. Slump and curing requirements shall be strictly adhered to.
- F. Reinforcing steel shall be placed, as per plan, and in accordance with Section 503 of Idaho Transportation Department's Standard Specifications for Highway Construction. Mortar blocks, or other devices approved by the Engineer, shall be used to maintain the concrete coverage required by the Plans.
- G. New sidewalk and pedestrian ramp construction shall conform to Engineering Specification ES-14 CONCRETE SIDEWALK; except as modified herein these specifications and the Plans.
- H. Water SHALL NOT be added to the surface of any concrete after placing - for any reason. Contraction joints shall be 3/8 inch minimum in depth.
- I. The contractor shall keep a person at the job site for a minimum of four hours following the concrete surface brooming operation for the purpose of both preventing and repairing any damaged surfacing to the newly placed concrete.
- J. Any existing water meters within the limits of the new sidewalk will be adjusted to grade by the Contractor. The Contractor shall coordinate the adjustment of the meter boxes with Moscow's Water Department.
- K. Cement concrete driveway approaches shall be constructed with air entrained concrete Class 40B conforming to the requirements Engineering Specification ES-11 CONCRETE.

The construction of the driveway approaches shall conform to the requirements of Engineering Specification ES-12 CONCRETE CONSTRUCTION REQUIREMENTS.

END OF SECTION

SECTION 02300 - 2

SECTION 02300 DRIVEWAYS

**SECTION 02311
ROUGH GRADING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This Section includes removal of topsoil, rough grading, and filling associated with contouring of site in preparation for building excavation and subsequent site Work.
- B. Removal of topsoil and subsoil.
- C. Cutting, grading, filling, and rough contouring the site.

1.2 RELATED SECTIONS

- A. City of Moscow Standards, Appendix A
- B. Geotechnical Report, Appendix B
- C. Section 01400 - Quality Assurance and Quality Control
- D. Division 2 – All Sections

1.3 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of utilities remaining, by horizontal dimensions, elevations or inverts, and slope gradients, referenced from permanent improvements.

PART 2 PRODUCTS

2.1 MATERIALS – See Schedule at the end of this section.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that survey benchmark and intended elevations for the Work are as indicated.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Identify known underground, above ground and aerial utilities. Stake and flag locations.
- C. Coordinate work with utility companies to remove and relocate utilities, as necessary.

- D. Protect above and below grade utilities that remain.
- E. Protect soil from erosion.
- F. Protect benchmarks, existing structures, fences, and sidewalks from excavating equipment and vehicular traffic. Replace in kind if damaged.

3.3 TOPSOIL EXCAVATION

- A. Remove topsoil from site per Section 02110 – Site Clearing.

3.4 SUBSOIL EXCAVATION

- A. Remove subsoil from site per Section 02110 – Site Clearing.

3.5 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.
- B. Fill areas to contours and elevations with approved materials.
- C. Make grade and alignment changes gradual. Blend slope into level areas.
- D. Remove surplus excavated or fill materials from site, at not cost to the Owner.
- E. Abate dust during construction using water from an approved source.
- F. Place fill material in continuous layers and compact in accordance with schedule at end of this section.

3.6 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 1/10-foot from required elevation.

3.7 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Quality Assurance Observation and Testing will be performed under provisions of Section 01400. Contractor is responsible for Quality Control per Section 01400.
- B. Compaction testing will be performed in accordance with ANSI/ASTM D1557 and with Section 01400.

3.8 SCHEDULES

Location	Soil			Crushed Aggregate				Other	Placement	
	S1	S2	S3	A1	A2	A3	A4		Max Loose Lift Thickness (in)	Compaction Requirement, Testing Method
Topsoil - See Section 02800 - Site Restoration										
Subsoil Fill ^(a)		x	x						8	90%, ASTM 1557, MDD
Structural Fill				x					8	95%, ASTM 1557, MDD
Granular Fill					x	x			8	95%, ASTM 1557, MDD

(a) Not to be used beneath structures or utilities.

END OF SECTION

SECTION 02311 - 3

ROUGH GRADING

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**SECTION 02315
EXCAVATION**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Excavating for building foundations
- B. Excavating for paving, roads, and parking areas
- C. Excavating for slabs-on-grade
- D. Excavating for site structures
- E. Excavating for landscaping
- F. Excavating for utilities
- G. Trench Excavation
- H. Rock Exploration
- I. Exploratory Excavation
- J. Excavation of unsuitable materials

1.2 RELATED SECTIONS

- A. City of Moscow Standards, Appendix A
- B. Geotechnical Report, Appendix B
- C. Section 01400 - Quality Control
- D. Section 01500 - Construction Facilities and Temporary Controls
- E. Division 2 - All Sections

1.3 SHORING AND TRENCH SAFETY

- A. Contractor shall prepare and submit a Trench Safety and Shoring plan 21 days prior to beginning excavation per Section 01300. The plan shall be prepared and sealed by a licensed professional engineer in the state of Idaho, and shall include the following components as a minimum:

1. Qualification statement of Contractor documenting successful implementation of shoring systems in similar soil conditions and to similar depths. Include references for at least three projects.
2. Qualification statement of professional engineer responsible for the shoring system design. Include references for at least three projects.
3. Construction approach including excavation plan, shoring method, excavation and shoring construction sequence, spoils staging or removal, and related activities.
4. Excavation geometry during construction and distance to adjacent structures, required OSHA temporary slope geometry, and excavation safety procedures.
5. Proposed excavation, backfill, compaction, hauling, and moisture control equipment, including make and model of each.
6. Native subgrade preparation procedures.
7. Method of moisture control.
8. Method of compaction.
9. Deleterious materials disposal plan.
10. Contingency plan for inclement weather.
11. Quality control and safety procedures, including:
 - a. Method of adherence to OSHA safety requirements.
 - b. Protocol for reviewing and, if necessary, amending the Trench Safety and Shoring plan during the course of the work.
 - c. Person responsible for ensuring requirements of this section and the contract are met.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Verify location of potentially conflicting utilities, underground, above ground, and overhead.

SECTION 02315 - 2

EXCAVATION

- C. Coordinate with utility owners to allow relocation of utilities if necessary.
- D. Identify limits of excavation to protect vegetation where possible.
- E. Protect all plant life outside the limits of construction.
- F. Identify and protect all benchmarks, existing structures, fences, sidewalks, paving, curbs, drainage way, etc.
- G. Establish temporary traffic control and detours when work is performed in public rights-of-way. Relocate controls and re-route traffic as required during progress of work.

3.2 EXCAVATION

- A. Contractor care shall be exercised during seasonally wet construction periods so that proof-rolling operations do not excessively disturb the subgrade.
- B. Implement trench safety and shoring measures per Contractor's submitted plan.
- C. Excavate subsoil and/or rock to accommodate the minimum backfill requirements.
- D. Grade top perimeter of excavation to prevent surface water from draining into excavated area.
- E. Hand trim excavation. Remove loose matter.
- F. Remove lumped subsoil, frozen subsoil, and boulders larger than 6 inches.
- G. Notify Engineer of unexpected subsurface conditions.
- H. Dewater excavation per Section 02140.
- I. Correct unauthorized on inadvertent over-excavation at no additional cost to Owner.
- J. Correct areas over-excavated by filling with CDF Fill or import aggregate as specified per Section 02320 – Backfilling and Compacting for Structures.
- K. Stockpile excavated material in a designated place on-site. No stockpile shall be higher than 8 feet. Stockpiles must be protected from eroding through proper BMPs until final placement is achieved.
- L. Repair damage to any impacted utilities.
- M. Preparation: To minimize differential settlement it is essential that earth surfaces upon which footings/foundations will be placed be compacted in accordance with the compaction requirements and be protected from rain and runoff. No footing shall be placed on saturated material. Footing/foundation material which becomes saturated

during construction due to lack of protection by the Contractor shall be over excavated to suitable material and backfilled with suitable backfill per Section 02320 – Backfilling and Compacting for Structures at no cost to the Owner.

- N. Debris encountered during excavation must be disposed of off-site in conformance with all local, state, and federal regulations.

3.3 TRENCHING

- A. Excavate subsoil required for utilities; dewater as required at no additional cost to the Owner.
- B. Remove lumped subsoil, boulders, and rock greater than one (1) cubic yard, measured by volume. Remove larger material as specified in Section 02316.
- C. Do not advance open trench more than 100 feet ahead of installed pipe.
- D. Excavate bottom of trenches maximum 2 feet wider than outside diameter of pipe.
- E. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.
- F. Excavations shall not interfere with 45 degree bearing splay of foundations. Correct interference excavations by filling with CDF Fill or import aggregate as specified per Section 02320 – Backfilling and Compacting for Structures.
- G. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered.
- H. Cut out soft areas of subgrade not capable of compaction in place and backfill with import material at no additional cost to the Owner.
- I. Support utility poles which may become undermined by excavation.
- J. Cut trenches sufficiently wide to enable safe installation of utilities and allow review, meeting dimensions shown on the plans. Minimize the length of open trenches.
- K. Provide trench shoring safety measures and shoring per Contractor's submitted plan. See Section 01500.
- L. Hand trim excavation: Hand trim for bell and spigot pipe joints. Remove loose matter.

3.4 EXCESS MATERIAL

- A. Material removed from excavations that is excess shall be removed, hauled, and disposed at an off-site waste site in accordance with local, state and federal requirements, at no cost to the Owner.

3.4 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01400.
- B. Provide for visual inspection of bearing surfaces and compaction testing per Section 01400.

3.5 PROTECTION

- A. Protect excavated area by methods required to prevent cave-in or loose soil from falling into trench.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.
- C. Prevent vehicles from traveling in a single track.
- D. Prevent water from flowing into, or ponding on, excavated surfaces.
- E. Protect all private and public property both within and adjacent to project limits.
- F. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION

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**SECTION 02320
BACKFILLING AND COMPACTING FOR STRUCTURES**

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. City of Moscow Standards, Appendix A
- B. Geotechnical Report, Appendix B
- C. Section 01300 – Submittals
- D. Section 01400 – Quality Assurance and Quality Control
- E. Division 2 – All Sections
- F. Division 3 – All Sections

1.2 REFERENCES

- A. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-pound) Rammer and a 457-mm (18-inch) Drop.
- B. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 foot pound-force/foot³ (600 kN-m/m³)).
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 foot pound-force/foot³ (2,700 kN-m/m³)).
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- F. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- G. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- H. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Samples: Submit, in airtight containers, 45 pound (20 kg) sample of each type of imported trench backfill to testing laboratory.
- C. Materials Source: Submit name of imported materials suppliers. Provide materials from same source throughout the work. Change of source requires Engineer's approval.
- D. Furnish each material from a single source throughout the Work.

PART 2 PRODUCTS

2.1 MATERIALS – See Schedule at the end of this section

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify fill materials to be used are acceptable.

3.2 PREPARATION

- A. Undisturbed Native Soil Subgrade Preparation - Following topsoil stripping and additional excavation required to achieve design grades, exposed undisturbed native soil subgrade surface shall be proof-rolled with several passes of a minimum 30,000-pound compactor as directed by the ENGINEER.
- B. Disturbed Native Soil Subgrade Preparation - Scarify disturbed native soil subgrade to a depth of eight (8) inches, moisture-condition as necessary, and compact to 95 percent of maximum dry density in accordance with ASTM D-1557 or to density requirements for subsequent backfill materials.
- C. If loose or soft pockets of subgrade are detected that cannot be compacted by repeated passes of the compactor, these areas shall be over-excavated and backfilled with properly compacted import structural fill material at no additional cost to the Owner.
- D. Contractor care shall be exercised during seasonally wet construction periods so that proof-rolling operations do not excessively disturb the subgrade.

3.3 BACKFILLING

- A. Backfill areas to contours and elevations with the material(s) specified at the end of this section.

SECTION 02320 - 2 BACKFILLING AND COMPACTING FOR STRUCTURES

- B. Place and compact material in continuous uniform horizontal layers not exceeding the loose lift thickness shown on the schedule at the end of this section.
- C. CDF backfill shall be placed when specifically noted on the Contract Drawings.
- D. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces. If wet, frozen, porous, spongy, or other unsuitable materials are encountered, backfill with import backfill at no additional cost to Owner.
- E. Employ a placement method that does not disturb or damage existing structures or utilities.
- F. Maintain moisture content within two percent of optimum moisture content for backfill materials to attain required compaction density. Contractor shall dry material, or moisture condition through addition of water to maintain optimum moisture conditions.
- G. Make gradual grade and alignment changes. Blend slope into level areas.
- H. Jetting or flooding of the backfill material in utility trench is not allowed.

3.4 TOLERANCES

- A. As specified in drawings and other sections.

3.5 FIELD QUALITY ASSURANCE

- A. Field testing will be performed under provisions of Section 01400.
- B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM C136 and ASTM D1557 and with Section 01400.
- C. Compaction testing will be performed in accordance with ASTM D698, ASTM D1557, and with Section 01400.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest at no cost to the Owner.
- E. Frequency of Compaction Tests: (Structures)
 - 1. If International Building Code (IBC) is applicable, test per IBC.
 - 2. Horizontal Location: One test at start of work on all four sides of structure, for each structure.
 - 3. Vertical Location: At every horizontal location, obtain one test at the prepared subgrade, one at the top of the backfill, and one test when materials or

SECTION 02320 - 3 BACKFILLING AND COMPACTING FOR STRUCTURES

procedures change. If a backfill material is greater than three feet in depth, include a test every three feet of fill.

F. Frequency of Compaction Tests: (embankments, roads, fills)

1. Horizontal Location: Test at each end of embankment or fill, with subsequent tests at every 100 feet along the length.
2. Vertical Location: At every horizontal location, obtain one test at half the depth of the fill, one test at the top of the fill, and subsequent test(s) at locations where materials or construction procedures change and adjacent to utility crossings. If fill is deeper than 12 feet, provide a total of three (low, middle, top of backfill).

3.6 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500.
- B. Recompact fills subjected to vehicular traffic before placement of subsequent layers.

3.7 SCHEDULE OF ALLOWABLE MATERIALS AND PLACEMENT REQUIREMENTS

Location	Soil (Section 02055)			Crushed Aggregate (Section 02060)				Other	Placement	
	S1	S2	S3	A1	A2	A3	A4	CDF ^(b)	Max Loose Lift Thickness (in) ^(c)	Compaction Requirement, Testing Method
Beneath structures and slabs on grade (greater than 8 inches below structure, includes correcting over-excavation)					X	X		X	8	95%, ASTM 1557, maximum dry density
Foundations above groundwater (minimum thickness of 6 inches)								X	8	95%, ASTM 1557, maximum dry density
Drainage foundations below groundwater (minimum thickness of 2 feet) ^(d)							X		8	95%, ASTM 1557, maximum dry density
Against structures at foundation excavations (within 5 feet)						X		X	8	95%, ASTM 1557, maximum dry density
Against structures at foundation excavations (beyond 5 feet)		X	X		X	X		X	8	95%, ASTM 1557, maximum dry density
Exterior slab-on-grade (minimum thickness of 8 inches)								X	8	95%, ASTM 1557, maximum dry density
Interior slab-on-grade (minimum thickness of 8 inches)								X	8	95%, ASTM 1557, maximum dry density
Backfill for Retaining Walls (drainage material required) ^(d)							X		8	95%, ASTM 1557, maximum dry density

- (a) *On-Site Materials may be used beneath roadways (not beneath or within 5 feet of concrete structures) if the materials have the following properties: Passing No. 200 Sieve < 15%; non-plastic. Maximum particle sizes shall be as allowed in these specifications. If not specified, maximum particle size shall be as recommended in the geotechnical report.*
- (b) *CDF as specifically indicated on the plans or at Contractor's option.*
- (c) *Loose lift thickness may be increased if permitted by Engineer depending on compaction equipment employed by Contractor.*
- (d) *Bring drainage foundation to within 6 inches of the structure foundation/slab. Provide minimum of 6 inch top course of structural fill per "Foundations above groundwater". Wrap geotextile and top course structural fill with geotextile as recommended in the geotechnical report (Section 01011).*

END OF SECTION

SECTION 02320 - 5

**BACKFILLING AND COMPACTING
FOR STRUCTURES**

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SECTION 02320 - 6

**BACKFILLING AND COMPACTING
FOR STRUCTURES**

SECTION 02324
BACKFILL AND COMPACTING FOR UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This Section includes backfilling and compacting for utilities from prepared subgrade to top of backfilled subgrade.
- B. Bedding of utilities.
- C. Backfilling and compaction above utilities.

1.2 RELATED SECTIONS

- A. City of Moscow, Appendix A
- B. Geotechnical Report, Appendix B
- C. Section 01400 - Quality Control
- D. Section 01500 - Construction Facilities and Temporary Controls
- E. Division 2 - All sections
- F. Section 15060 - Pipe and Fittings
- G. Section 15100 – Process Hydraulic Valves

1.3 REFERENCES

- A. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).

- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- F. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- G. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- H. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

1.4 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit, or cable.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Samples: Submit, in airtight containers, 45 lb. (20 kg) sample of each type of imported trench backfill to testing laboratory.
- C. Materials Source: Submit name of imported materials suppliers. Provide each material from a single source throughout the Work. Change of source requires Engineer's approval.

1.6 FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the Work are as shown on drawings.

PART 2 PRODUCTS

2.1 MATERIALS

- A. See Schedule at the end of this section.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify fill materials to be reused if acceptable.

3.2 PREPARATION

- A. Undisturbed Native Soil Subgrade Preparation - Following topsoil stripping and additional excavation required to achieve design grades, exposed undisturbed native soil subgrade surface shall be proof-rolled with several passes of a minimum 30,000-pound compactor as directed by the ENGINEER.
- B. Disturbed Native Soil Subgrade Preparation - Scarify disturbed native soil subgrade to a depth of eight (8) inches, moisture-condition as necessary, and compact to 95% of maximum dry density in accordance with ASTM D1557 or to density requirements for subsequent backfill materials.
- C. Trench Foundation Stabilization - If loose or soft pockets of subgrade are detected that cannot be compacted by repeated passes of the compactor, these areas shall be over-excavated and backfilled with properly compacted import structural fill material at no cost to the Owner.
- D. Contractor care shall be exercised during seasonally wet construction periods so that proof-rolling operations do not excessively disturb the subgrade.
- E. Identify required lines, levels, contours, and datum.
- F. Identify, maintain, and protect existing utilities remaining, which pass through work area.
- G. Protect benchmarks, existing structures, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
- H. Protect above and below grade utilities that are to remain.
- I. Provide means by which natural drainage ways can be diverted away during trenching. Do not permit runoff water to enter the trench.

3.3 BEDDING

- A. Pipe bedding is material from 4 inches below the bottom of the utility (6 inches for pipes greater than 30 inches), including pipe bells, to 6 inches above the top of the utility for the full width of the trench.
- B. Prior to placement of the pipe on the first layer of bedding, excavate for bell holes and support pipe and conduit during placement and compaction of bedding.
- C. Place bedding in layers no thicker than 6 inches in depth unless otherwise directed by Engineer. Allow for bedding depth around pipe bells. Place the first layer from a point 4 inches below the pipe, 6 inches for pipes 30 inches and larger, to the bottom outside of the pipe.

- D. Shovel, slice, and tamp to ensure that the bedding material is firmly placed.
- E. Following placement of the pipe, place additional bedding layers up to the springline of the pipe. Shovel, slice, and tamp to ensure bedding material fills in and supports the pipe haunch area.
- F. In the event that the trench shoring or the trench box is below the springline of the pipe, raise the shoring or trench box above the pipe springline and recompact the bedding (shovel, slice, and tamped).
- G. In 6 inches lifts, place additional bedding layers from the pipe springline to 6 inches above the pipe.
- H. Compact each lift of bedding material to 95 percent of the MDD as determined by ASTM D-1557.
- I. If compaction fails, provide necessary additional compaction effort to meet the specified requirements at no cost to the owner.
- J. Use lean concrete (CDF) where indicated on the Contract Drawings.
- K. Employ a placement method that does not disturb or damage pipe in trench.
- L. Maintain moisture content within 3 percent of optimum moisture content for fill materials to attain required compaction density.

3.4 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen materials specified at the end of this section.
- B. In non-roadway areas, backfill trench as soon as possible and within 24 hours of pipe placement.
- C. In roadway areas, backfill after placement of each section of pipe and complete backfill and cleanup at the end of each workday.
- D. Place pipe locating wire and marking tape as required.
- E. Place thrust blocks as necessary.
- F. Place and compact material on compacted pipe bedding material in continuous uniform horizontal layers not exceeding the loose lift thickness shown on the schedule at the end of this section.
- G. CDF backfill shall be placed when specifically noted on the Contract Drawings.

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BACKFILL AND COMPACTING FOR UTILITIES

- H. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- I. Employ a placement method that does not disturb or damage pipe in trench.
- J. Maintain moisture content within 2 percent of optimum moisture content for fill materials to attain required compaction density. Contractor shall dry material, or increase moisture condition through addition of water to maintain optimum moisture conditions.
- K. Leave fill material stockpile areas completely free of excess fill materials.
- L. Material removed from the trench that is unsuitable for backfill shall be removed and hauled to a waste site and replaced with import Aggregate Materials, as determined by the Engineer, to the lines and grades determined by the Engineer at no cost to the Owner.
- M. Material removed from the trench that is excess shall be removed and hauled and disposed of at an off-site waste site in accordance with local, state and federal requirements, at no cost to the Owner.
- N. Jetting or flooding of the backfill material in utility trench is not allowed.
- O. Any water to be used to facilitate compaction in accordance with these specification requirements shall be POTABLE water.

3.5 FIELD QUALITY ASSURANCE

- A. Field review and testing will be performed under provisions of Section 01400.
- B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM C136 and Section 01400.
- C. Compaction testing will be performed in accordance with ANSI/ASTM D1557 and Section 01400.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest at no cost to the Owner.
- E. Frequency of Compaction Tests (Trench):
 - 1. Horizontal Location: Test at start of pipe reach with subsequent tests at every 100 feet along the trench length.
 - 2. Vertical Location: At every horizontal location, obtain one test at half the depth of the trench backfill, one test at the top of the trench backfill, and subsequent

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BACKFILL AND COMPACTING FOR UTILITIES

test(s) at locations where materials or construction procedures change and adjacent to utility crossings. If utility is deeper than 12 feet below grade, provide a total of three (low, middle, top of backfill).

3.6 PROTECTION OF FINISHED WORK

- A. Protect trench excavation to prevent cave-in.
- B. Maintain and protect finished Work until project is completed.
- C. Recompact fills subjected to vehicular traffic.

3.7 ALLOWABLE MATERIALS AND PLACEMENT

- A. Backfill and material placement shall be per City Standards. If discrepancy City standards shall govern unless specifically authorized in writing by Owner and Engineer.

END OF SECTION

SECTION 02677
DISINFECTION AND IRON BACTERIA PREVENTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Procedures for disinfecting to prevent the introduction of bacteria

1.2 RELATED SECTIONS

- A. Section 01300 – Submittals
- B. Section 11103 – Vertical Multistage Pump
- C. Section 11111 – Horizontal End Suction Pump
- D. Section 15060 – Pipe and Pipe Fitting
- E. Section 15100 - Valves

1.3 REFERENCES

- A. ANSI/AWWA B300 - Standard for Hypochlorites
- B. ANSI/AWWA B301 - Standard for Liquid Chlorine
- C. ANSI/AWWA C651 - Standards for Disinfecting Water Mains
- D. NSF/ANSI 60 – Drinking Water Treatment Chemicals.

1.4 SUBMITTALS

- A. Submit method and procedures for disinfecting and testing fourteen (14) days prior to beginning. The plan shall include at a minimum:
 - 1. Schedule for the disinfection and testing.
 - 2. Method of mixing the water.
 - 3. Plan for controlling the discharge, including storage requirements or point of discharge and how the water will be neutralized.
- B. Submit in accordance with Section 01300 - Submittals.

1.5 PERMITS, CERTIFICATIONS, LAWS, AND ORDINANCES

- A. Procure all permits, licenses, and certifications required to handle, store and use the disinfecting agent.

- B. Conform to all federal, state, and local rules and regulations when handling, storing, and using the disinfecting agent.

PART 2 - PRODUCTS

2.1 FORMS OF CHLORINE

- A. Sodium Hypochlorite: conforming to AWWA B300 in liquid form.
- B. Calcium Hypochlorite: conforming to AWWA B300 in granular or tablet form.

2.2 NEUTRALIZING CHEMICALS

- A. Sulfur Dioxide.
- B. Sodium Bisulfite.
- C. Sodium Metabisulfite.
- D. Sodium Sulfite.

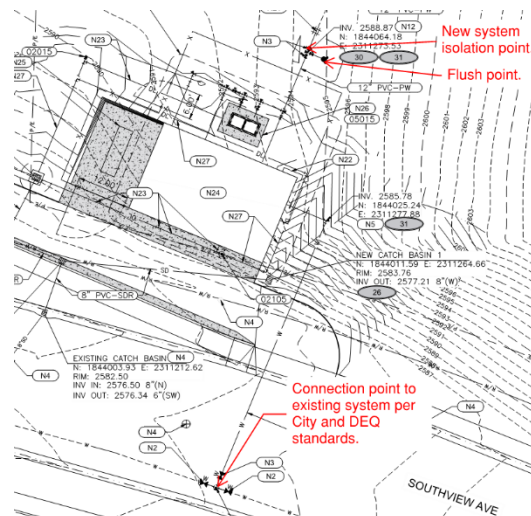
2.3 EQUIPMENT

- A. Provide all necessary equipment to clean all tools, permanent equipment and materials used in the project and to spray the same with a chlorine solution.
- B. Provide all necessary equipment to introduce chlorine solution, agitate and flush as part of final disinfection.

PART 3 - EXECUTION

3.1 EXISTING SYSTEM CONNECTION

- A. INDIAN HILLS – Contractor shall connect to the existing distribution system on the north leg of the new 12-inch PVC pipe in Southview Ave, as shown in the image below.



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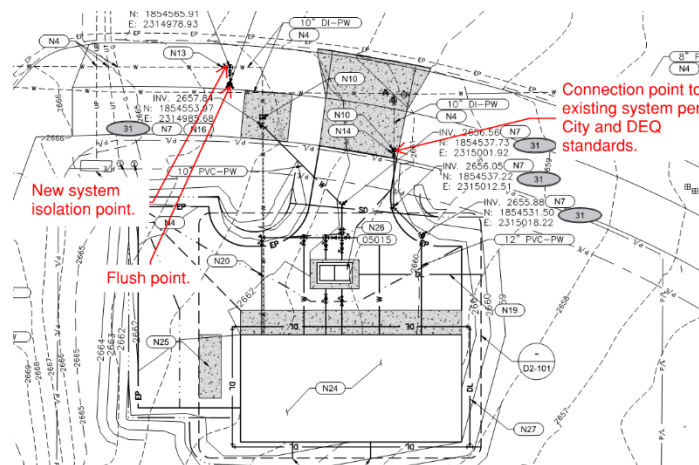
**DISINFECTION AND IRON
BACTERIA PREVENTION**

Connection to the existing distribution system shall be per City and DEQ standards. Contractor shall isolate new system piping using gate valve immediately north of new fire hydrant. Contractor shall flush system through new fire hydrant and water shall be disposed of per City and IDEQ requirements.

- B. PONDEROSA - Contractor shall connect to the existing distribution system on the south leg of the existing 10-inch DI pipe in Lanny Lane, as shown in the image below. Connection to the existing distribution system shall be per City and DEQ standards. Contractor shall coordinate the shutdown and system isolation with the City Water Department. Contractor is not to operate City Valves. Isolate new system piping using new gate valve immediately west of new fire hydrant. Contractor shall flush system through new fire hydrant and water shall be disposed of per City and IDEQ requirements.

3.2 EQUIPMENT AND MATERIAL DISINFECTION

- A. Clean all equipment and materials to be installed. Remove all foreign material from the surface. If necessary, pressure wash items to remove mud, oil, grime, and other foreign materials.
- B. All permanent equipment and materials to be installed shall be chlorinated just prior to installation.
- C. Spray the entire surface of casings, screens, pumps, pipe column, and other permanent items with a chlorine solution with a residual of at least 500 mg/l.



- D. Place items being disinfected on support blocks or trusses as appropriate to prevent ground contact both during and after disinfection.
- E. If equipment or material becomes contaminated after disinfection by ground contact or other means, repeat disinfection procedures.

3.3 FINAL DISINFECTION

- A. Once the equipment is installed, the Contractor shall perform the final disinfection. Contractor will be required to perform all disinfection necessary to achieve two absent total coliform bacteria test results taken by the Owner at least 24 hours apart as described in the Owner's referenced standards. The final disinfection procedures and chlorine concentrations included herein are considered minimum criteria. Contractor is responsible for performing additional measures or modification of these methods to achieve stated results.
- B. Final disinfection will include raising chlorine levels to at least 50 mg/l through the entire system, agitating, and then flushing the system.
- C. Raise chlorine residual level to at least 50 mg/l.
- D. Agitate using surge block, or other device to agitate water immediately surrounding the newly installed equipment. Allow water to rest for at least 12 hours.
- E. Flush the water until the chlorine residual is reduced to system residual. Continue pumping for at least an additional 15 minutes.
- F. If the presence of coliform bacteria is detected, repeat chlorination as described below at no additional cost to the Owner until a negative test result is achieved.

3.4 CHLORINATED WATER DISCHARGE

- A. Contractor shall control the discharge of chlorinated water to avoid damage to the site, the City stormwater system, and the downstream Paradise Creek.
- B. Contractor may use neutralizing chemicals to reduce chlorine concentrations, but Contractor shall take care not to over-apply.

END OF SECTION

SECTION 02830
CHAIN LINK FENCING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Chain link fencing fabric, posts, braces, anchorage, gates, miscellaneous hardware and appurtenances.

1.2 REFERENCE STANDARDS

- A. ASTM A 53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- B. ASTM A 121: Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
- C. ASTM A 392: Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
- D. ASTM A 641: Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- E. ASTM F 567: Standard Practice for Installation of Chain-Link Fence.
- F. ASTM F 573: Standard Specification for Residential Zinc-Coated Steel Chain-Link Fence Fabric.
- G. ASTM F 626: Standard Specification for Fence Fittings.
- H. ASTM F 654: Standard Specification for Residential Chain-Link Fence Gates.
- I. ASTM F 668: Standard Specification for Polyvinyl Chloride (PVC)-Coated Steel Chain-Link Fence Fabric.
- J. CLFMI: Chain Link Fence Manufactures Institute Product Manual for Chain Link Fence Installation.

1.3 SUBMITTALS

- A. Drawings: Indicate plan layout, grid, size and spacing of components, accessories, fittings, anchorage, and post section.
- B. Data: Submit manufacturer's installation instructions and procedures, including details of fence and gate installation.
- C. Submit sample for fence fabric and typical accessories.

PART 2 PRODUCTS

2.1 GENERAL

- A. Galvanizing: Class 3 per ASTM A 121.
- B. Polyvinyl Chloride (PVC): With PVC coated materials, paint all posts, fittings, hardware and accessories as indicated to match PVC color. The fabric shall be hot-dipped galvanized steel wire complying with ASTM A 392 and coated with a continuous PVC bonding process (minimum 15 mil thickness) in accordance with ASTM F 668. Color of PVC coating shall be black, and applied free of voids, cracks, tears, and shall have a smooth and lustrous surface.
- C. Steel: Schedule 40 per ASTM A 53.
- D. Concrete: Class 3000 minimum, per Cast-in-Place Concrete Section.

2.2 CHAIN LINK FABRIC

- A. 11-gauge steel wire fabric for all fences equal to or less than sixty (60) inches in height and 9-gauge for fences over sixty (60) inches coated as follows:
 - 1. Zinc coating per ASTM A 392 requirements.
 - 2. Polyvinyl chloride coating per ASTM F 668 requirements.
- B. Unless indicated otherwise, use chain link fabric that has approximately two (2) inches square mesh and coated after fabrication.
- C. Knuckle finish top edge and twist and barb bottom edge of fabric less than sixty (60) inches wide. For fabric sixty (60) inches or greater in width, knuckle both top and bottom edges. Provide fabric that barbing has been done by cutting the wire on the bias.
- D. If indicated, insert slats in fabric.

2.3 BARBED WIRE

- A. Two strand, 12-1/2-gauge wire with 14-gauge, 4-point round barbs spaced approximately five (5) inches on center, if indicated on plans.

2.4 TENSION WIRES AND FABRIC TIES

- A. Tension Wires: 7-gauge galvanized coil spring steel wire per ASTM A 641 requirements.
- B. Fabric Fasteners: 9-gauge galvanized or 6-gauge aluminum wire, or approved non-corrosive metal bands, for ties to fasten fabric to posts, rails, and gate frames. Fasten fabric to bottom tension wire spaced twenty-four (24) inches on center.

2.5 TRUSS OR TENSION BARS

- A. Galvanized steel rod 3/8-inch diameter for truss or tension bars used in trussing gate frames and line posts adjacent in end, corner, slope, or gate posts. When used in trussing line posts, provide adjustment by means of galvanized turnbuckles or other suitable tightening devices.
- B. Tension Bars:
 - 1. Galvanized high carbon steel bars not smaller than 3/16-inch x 3/4 inch for tensions bars to fasten fabric to end and corner posts and gate frames. Provide one (1) tension bar for each end post and two (2) for each corner and pull post per section of fabric.
 - 2. Use tension bar bands made from heavy pressed galvanized steel spaced on fifteen (15) inch centers to secure tension bars to posts.

2.6 POSTS, CAPS, RAILS, COUPLINGS

- A. Posts: Galvanized Schedule 40 steel, at the indicated length.
- B. Caps: Pressed galvanized steel or malleable iron designed for fit securely over post ends forming a weather tight closure. Where a top rail is used, provide cap to permit passage of top rail. "H" section posts do not require caps.
- C. Top, Intermediate, and Bottom Rails: Galvanized steel, in lengths as required. Provide joint couplings to connect rails securely. Provide means for attaching top rail securely to each end, corner, line, slope, and gate posts.
- D. Joint Coupling: Galvanized steel, six (6) inches long minimum for each joint. One (1) coupling in five (5) shall have expansion spring. Couplings shall be outside sleeve type with bore of sleeve true to maintain adjacent lengths of rail in alignment.

Table 1 – Posts, Frames, Stiffeners, Rails

Proposed Use	Nominal Type and Size
End, corner, slope, and gate posts for single gates 6 feet or less in width and double gate 12 feet or less in width for:	
1. Fence less than 72 inches high	2 1/2" OD Pipe
2. Fence 72 inches or higher	2 7/8" OD Pipe
Gate posts for single swing gate over 6 feet, but not over 13 feet in width and double swing gates over 12 feet, but not over 26 feet in width or for all slide gates with leaves larger than 6 feet	4" OD Pipe
Gate posts for single swing gates over 13 feet, but not over 18 feet in width and double swing gates over 26 feet, but not over 36 feet in width; backstop posts	6 5/8" OD Pipe
Gate posts for single swing gates over 18 feet in width and double swing gates over 36 feet	8 5/8" OD pipe
Frame for gates	1 5/8" OD pipe
Stiffeners for gates	1 1/4" OD pipe
Line posts for fence 72 inches or higher	2 7/8" OD pipe
Line posts for fences less than 72 inches high	2 3/8" OD pipe
Top Rail	1 5/8"OD pipe or 1 1/2"x1 5/8" "H"
Bottom Rail	7 gauge, coiled spring steel tension wire

2.7 FITTINGS AND HARDWARE

- A. Unless indicated otherwise, galvanize fittings and hardware.
- B. Rivets: Make all hardware attachments with galvanized steel rivets.

2.8 SUPPORT OR EXTENSION ARM

- A. Use support or extension arms for barbed wire that are of a type that can be attached to the tops of the posts and carry the number of wires indicated.
- B. Use only support arms on the fence for barbed wire that are capable of supporting a 250-pound vertical load at the end of the arm without causing permanent deflection.
- C. Single support arms are to be integral with a top post weather cap and have a hole for passage of the top rail when required.

2.9 GATES

- A. Residential gates: Refer to ASTM F 654 requirements.
- B. Provide additional horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware and accessories.
- C. Assemble gate frames and attach hardware by welding or by using fittings and rivets to make rigid connections. Use same fabric as for fence. Install fabric with stretcher bars to gate frame at not more than fifteen (15) inches on center.
- D. Provide diagonal cross-bracing consisting of 3/8-inch diameter adjustable length truss rods on gates where necessary to prevent frame from sagging or twisting.

2.10 GATE HARDWARE

- A. Hinges: Pressed steel or malleable iron to suit gate sizes, non-lift-off type, offset to permit 180-degree gate opening. Provide minimum of one pair of hinges for each leaf.
- B. Latch: Forked steel type or plunger-bar steel type to permit operation from either side of gate. Provide locking device and padlock eye as integral part of latch.
- C. Keeper: Provide keeper for all vehicle gates which automatically engages the gate leaf and holds it in the open position until manually released.
- D. Gate Stops: Mushroom type or flush plate with anchors set in concrete to engage the center drop rod or plunger bar.

2.11 ALTERNATIVE FINISHES

- A. Where a colored finish other than galvanized is desired, the following shall apply:
 - 1. All metal posts, caps, rails, and hardware (excepting fabric) shall be painted.
 - 2. Where paint is applied to a galvanized surface, the paint shall be a modified phenolic alkyd type (Valley Paint V-101 or approved equal) or an acrylic type (Valley Paint 2532 Valcryn or approved equal) or Aquapon. The color shall be black to match color of vinyl clad fencing.
 - 3. Where paint is applied directly to a metal surface (non-galvanized), an industrial strength steel primer shall first be applied per manufacturer's specifications. The steel surface shall be properly prepared prior to painting by first grinding all welds smooth and even, ensuring that no holes or pits are present due to welding or any other cause, removing all rust and corrosion, and then applying primer.

PART 3 EXECUTION

3.1 PREPARATION

- A. Coordinate utility location. Follow Coordination Section.
- B. Excavate per Excavation Section requirements.
- C. Refer to ASTM F 567 requirements and CLFMI products manual for chain link fence installation.
- D. Protect existing trees.
- E. Limit the amount of clearing and grading along the fence line to permit proper installation.

3.2 LAYOUT OF WORK

- A. Accurately locate and stake location and points necessary for installation of fence and gates.
- B. General arrangements and location of fence and gates are indicated. Install except for minor changes required by unforeseen conflicts with work of other trades.

3.3 INSTALLATION OF POSTS

- A. Space line posts as follows:
 - 1. Tangent sections to 500 feet radius: 10 feet maximum.
 - 2. 200 feet radius to under 500 feet radius: Eight feet maximum.
 - 3. 100 feet radius to under 200 feet radius: Six feet maximum.
 - 4. Under 100 feet radius: Five feet maximum.
- B. Provide pull posts at 500 feet maximum intervals. Changes in line of 30 degrees or more are considered corners.
- C. Set all posts to true line and grade in concrete bases or in approved pipe sleeves or sockets. Check for vertical and horizontal alignment.
- D. Posts shall have concrete bases of at least ten (10) inches in diameter. Place a minimum of six (6) inches concrete below each post. Depth of post in concrete shall be as follows:
 - 1. Line Posts: 18 inches.
 - 2. End, Pull, Corner, and Gate Posts of less than 6 inches Diameter: 24 inches

3. Gate posts: 30 inches.

- E. Where posts are required to be set in concrete walls or masonry, set sockets for the posts to a depth of at least 18 inches. Use sockets that consist of lengths of 0.048-inch galvanized metal pipe sleeves, with an inside diameter sufficient to allow the posts to fit loosely therein. Coat the inside of the socket and outside of the posts with an approved bituminous paint. Caulk the posts securely in place with lead wool.

3.4 INSTALLATION OF BRACE ASSEMBLIES

- A. Attached horizontal brace rail from the mid-point of end, pull, corner, or gate posts to the mid-point of the first ensuing line post as a compression member. Install braces from top of said line posts back to the bottom of the end, pull, corner, or gate post with steel truss rods and turnbuckles so posts are plumb when diagonal truss rod is under proper tension.

3.5 INSTALLATION OF RAILS

- A. Install rails level and plumb with grade between posts and attached to posts before stretching fabric. Top rails shall form continuous brace from end-to-end of each run of fence.

3.6 INSTALLATION OF FENCE FABRIC

- A. Place fence fabric on the security side of posts unless otherwise specified. Place fabric approximately one (1) inch above the ground. Maintain a straight grade between posts by excavating high pints of the ground. Filling depressions with soil will be permitted only upon approval of Engineer.
- B. Stretch the fabric taut and securely fasten to posts. Fasten to end, gate, corner, and pull posts. Secure stretcher bars with metal bands spaced at fifteen (15) inch intervals. Cut the fabric and fasten each span independently at all pull and corner posts. Fasten to line posts with tie wire, metal bands, or other approved methods at fifteen (15) inch intervals. Attach the top edge of fabric to the top rail or tension cable at approximately twenty-four (24) inches intervals. Attach bottom tension wire to fabric with tie wires at twenty-four (24) inch intervals and secure to the end of pull posts with brace bands.
- C. Draw barged wire to assure minimum sag at high temperature and no breakage at low temperature. Connect the wires and arms by means of 0.142-gauge galvanized wire stays.

3.7 INSTALLATION OF GATES

- A. Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage as recommended by the fence manufacturer. Adjust hardware for smooth operation.

3.8 REPAIR DAMAGED COATING

- A. Grind smooth and wire brush all welds made after galvanizing to remove loose or burned

zinc coating, after which neatly coat the areas with 50-50 solder or as otherwise directed by the Engineer. Make repairs to abraded or otherwise damaged zinc coating in a similar manner. Replace PVC coating.

END OF SECTION

SECTION 02890
UNDERGROUND IRRIGATION SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Underground irrigation systems complete with heads, valves, controls, and accessories.
- B. Related sections:
 - 1. Section 02891 Planting

1.2 REFERENCE STANDARDS

- A. NFPA 70: National Electric Code.
- B. ASTM: American Society for Testing and Materials
- C. IA: The Irrigation Association: Main BMP Document, Landscape Irrigation Scheduling and Water Management Document.
- D. ASIC: American Society of Irrigation Consultants: ASIC Grounding Guideline
- E. City Codes/Ordinances relating to Landscape and Irrigation

1.3 DEFINITIONS

- A. Water Supply: Culinary and/or secondary pumping, piping, and components provided and installed by others to provide irrigation water to this project. Includes but is not limited to: storage ponds, pump stations, saddles, nipples, spools, shut-off valves, corporation stop valves, water meters, pressure regulation valves, and piping or components upstream of (or prior to) the Point-of-Connection.
- B. Point-of-Connection: Location where the Contractor shall tie into the water supply for landscape irrigation needs and use. Tie to existing piping.
- C. Main Line Piping: Pressurized piping downstream of the point-of-connection to provide water to remote control valves and quick coupling valves. Normally piping is under constant pressure.
- D. Lateral Line Piping: Circuit piping downstream of the remote-control valves to provide water to sprinkler heads, drip system, or bubblers. Normally piping is under pressure only when control valve is in operation.

1.4 PERFORMANCE REQUIREMENTS

- A. The work to be performed under this Section shall consist of furnishing all labor and materials necessary to construct a complete working and tested underground sprinkler irrigation system per all drawings and specifications, providing one hundred (100) percent head-to-head coverage on all lawn and planting areas on the site without overspray onto hardscape, buildings, or other site features. Included also will be system maintenance and warranties.
- B. The efficiency of the completed irrigation system shall meet the following minimum standards:
 - 1. Circuits using spray sprinklers shall perform at a minimum 60% efficiency.
 - 2. Circuits using rotor sprinklers shall perform at a minimum 70% efficiency.
 - 3. Efficiency shall be determined by an independent water audit performed by a certified irrigation auditor selected by the Owner. The Contractor shall include in his bid price the cost of this audit. The audit shall be conducted after substantial completion and before final acceptance of the irrigation system.
- C. The Contractor shall perform, but not be limited to, all of the following functions: paying all connection fees, deposits, and all other charges related to the connection to the water source; obtain all permits; complete all excavation and backfill; provide backflow device, tapping saddle, yoke, stop and waste, corp. cock, concrete vaults and miscellaneous pipe fittings; make necessary road repairs; provide safety barrier; make connection to water source; install all electric valves, valve control devices, isolation gate valves, quick coupling valves, drain valves, meter base, conduit, junction boxes, controller, backflow prevention devices and enclosures, filters and enclosures, and all necessary wiring. All work shall comply with applicable codes and requirements of the utility companies involved.
- D. If any or all of the above-mentioned fees or charges are not listed on the bidding schedule or on the plan, they shall be included in the bid lump sum price of the irrigation sprinkling system item.
- E. Contractor shall verify with the appropriate water district the location of the water service main line and water pressure and complete all requirements necessary to bring water service to the site. Total cost to be included in the irrigation sprinkling system bid item.
- F. The above specification statement supersedes the graphic representation location of the contract limit line. This pertains to the water line location on either side of the street adjacent to the project site.
- G. All work shall be done in accordance with the drawings and specifications, as well as all applicable water and electrical codes.
- H. The Contractor shall operate, maintain until acceptance, and guarantee the new system as specified herein until all lawn and plants installed on this project have become established and have been accepted by the Owner.

1.5 SUBMITTALS

- A. Product Data: Complete set of manufacturer's technical data and installation instructions for all equipment to be installed on the project. Submittal shall be made prior to commencement of any irrigation work.
- B. Main line and lateral line pressure test results: Submitted at the time of occurrence.
- C. Operation and Maintenance (O&M) Manual:
 - 1. O&M manual shall contain the following information:
 - a. Manufacturer cut sheets and current printed specifications for each element or component of the irrigation system.
 - b. Parts list for each operating element of the system.
 - c. Manufacturer's printed literature on operation and maintenance of operating elements of the system.
 - d. Section listing instructions for overall system operation and maintenance. Include directions for spring start-up and winterization.
 - 2. Manual shall be submitted at least thirty (30) days prior to final inspection and acceptance of the project.
- D. Complete As-Built Drawings:
 - 1. Drawings shall conform to the following criteria:
 - a. One (1) 22" x 34" and one (1) 11" x 17" drawing shall be submitted.
 - b. All submitted drawings shall be made on Mylar or Tyvek original.
 - c. Show detail and dimension changes made during installation.
 - d. Include field dimension locations of sleeving, points of connection, main line piping, wiring runs not contained in main line pipe trenches, valves and valve boxes, quick coupling valves.
 - e. Dimensions shall be taken from permanent constructed surfaces, features, or finished edges located at or above finished grade.
 - 2. A complete set of as-built drawings shall also be submitted in electronic digital format (.pdf).
 - 3. As-Built drawings shall be submitted prior to final inspection and acceptance.
- E. Controller Map: Each controller shall be equipped with a color-coded copy of the area that the controller services. Include valve zone number, type of plant material irrigated,

and zone location on the project. Laminate map with heat shrink clear plastic and mount inside controller.

1.6 QUALITY ASSURANCE

- A. Acceptance: Do not install work of this section prior to acceptance of the area by the Owner as being properly prepared to receive said work (i.e. at proper grade, properly compacted, permanent fixtures in place, etc.).
- B. Adequate Water Supply: Contractor shall verify that proper connection is available to supply lines and is of adequate size and volume. Perform static water pressure test prior to commencement of work. Notify Owner of problems encountered prior to proceeding.
- C. Workmanship: It is the intent of this specification that all materials herein specified with the best standards of practice relating to the trade.
- D. The Contractor shall provide to the City a document or resume which includes the following information:
 - 1. The Contractor has been installing sprinkler systems on commercial projects for at least ten (10) previous consecutive years.
 - 2. The Contractor is currently licensed to perform landscape construction in the State of Idaho.
 - 3. The Contractor is bondable and insurable for the work to be performed.
 - 4. References of at least five (5) projects of similar size and scope completed within the last five (5) years. Three (3) of the projects listed must be located in the general region of the project site.
 - 5. List of suppliers from whom materials will be obtained for use on this project.

1.7 PROJECT CONDITIONS

- A. Any discrepancies between existing site conditions and those indicated on the plans shall be called to the attention of the Landscape Architect or Owner's Representative prior to continuance of the project.
- B. The Contractor shall use only the equipment and products specified in the construction drawings. No substitution of materials will be allowed on the irrigation system without prior authorization from the Landscape Architect and the Owner's Representative.
- C. During delivery, installation, and storage of materials for the project, all materials shall be protected from contamination, damage, vandalism, and prolonged exposure to sunlight. All material stored at the project site shall be neatly organized in a compact arrangement and storage shall not disrupt the project Owner or other trades on the project site. All material to be installed shall be handled by the Contractor with care to avoid breakage or

damage. Materials damaged by the Contractor shall not be used but shall be replaced with new materials at the Contractor's expense.

- D. The Contractor shall familiarize himself and his workmen with all hazards and existing utilities prior to commencing work. This shall require local Blue Staking to be completed before any construction activity can begin.

PART 2 PRODUCTS

2.1 GENERAL

- A. The Contractor shall provide all materials to be used on this project. The Contractor shall not remove any material purchased for this project from the project site, nor mix these project materials with other contractor-owned materials. The Owner retains the right to purchase and provide project materials.
- B. Handling and unloading of all equipment, pipe, and fittings shall be in such a manner as to insure delivery to the job site in a sound, undamaged condition. Any installed equipment or pipe found to be damaged or defective in workmanship or materials shall be rejected and removed and replaced at Contractor's expense.

2.2 PIPE

- A. All PVC pipe used on this project for the irrigation system shall conform to the requirements of ASTM -1685. It shall be free of cracks, holes, foreign material, blisters, inside bubbles, wrinkles, and dents.
- B. All main line pipe, three (3) inches inside diameter and smaller shall be Schedule 40 PVC solvent weld bell end unless otherwise specified.
- C. All lateral line pipe shall be Schedule 40 PVC solvent weld.
- D. Maximum flows allowed through main line and lateral line pipe shall be determined by water speed in the pipe. The maximum water speed allowed in both main lines and lateral lines is five (5) feet per second. The resulting maximum gallons per minute (gpm) allowed to flow through PVC pipes are as follows:

<u>PIPE SIZE</u>	<u>GPM</u>
3/4"	8
1"	12
1 1/4"	22
1 1/2"	30
2"	50

- E. No bends in pipe shall be permitted. The Contractor shall use elbow fittings of ninety (90), forty-five (45), twenty-two and one half (22-1/2), and eleven and one quarter (11-1/4) degrees as individual situations demand.
- F. All pipe used from the main line to the control valves shall be solvent weld Sch. 80 PVC pipe unless otherwise noted or shown on the construction drawings.

2.3 FITTINGS

- A. All PVC fittings used on this project for the irrigation system shall conform to the requirements of ASTM D-2466.
- B. Main Line Fittings:
 - 1. All main line fittings three (3) inches and smaller inside diameter shall be solvent weld Schedule 80 PVC.
- C. Lateral Line Fittings:
 - 1. All lateral line fittings shall be solvent weld Schedule 40 PVC.
 - 2. All risers and exposed fittings shall be solvent weld Schedule 80 PVC, including conversions to metal pipe and fixtures, unless otherwise noted on the plans.
- D. PVC Cement: Solvent weld or glued joints shall use the following materials:
 - 1. Primer: IPS Weld-On P-70 Primer (purple), ASTM F-656.
 - 2. Cement: IPS Weld-On 711 Heavy Bodied PVC Cement (gray), ASTM D-2564.

2.4 VALVES

- A. Master Valve: All master valves shall be as specified in the Irrigation Equipment Schedule. Master valve assembly shall be installed according to detail in drawings.
- B. Isolation Gate Valve:
 - 1. Isolation gate valves shall only be used on the main line.
 - 2. Buried valves shall have two (2) inch square operating nuts. No handles or wheels will be permitted. Valves inside structures (vaults or valve boxes) may have wheel handles if the valve is two (2) inches or less in size.
 - 3. Action unions shall be installed on each side of all valves except flanged valves.
 - 4. The Contractor shall provide adequate material for the connection of valves to the system, i.e., adapters, flanges, nuts, bolts, gaskets, etc.
 - 5. All buried main line isolation valves with a (2) inch square operating nut shall be

fitted with a four (4) inch minimum diameter pipe sleeve place over the top of the valve vertically and extended to grade. Cover with a ten (10) inch round plastic valve box with bolt down lid and set at finished grade.

6. Contractor shall provide appropriate valve key to operate isolation gate valve.

C. Remote Control Valve Assembly:

1. Remote control valves shall be as specified in the Irrigation Equipment Schedule.
2. Remote control valves shall be globe configuration, electrically activated, normally closed, forward flow design.
3. All pipe on the control valve assembly shall be Schedule 80 PVC pipe. See detailed drawings.
4. Action unions shall be installed on each side of the control valve assembly, allowing valve to be removed from the box for maintenance without cutting pipe.
5. Each control valve shall have a brass gate or ball valve installed immediately upstream of the valve and located within the same valve box.
6. Flows through each remote-control valve shall not exceed the following limits:

<u>VALVE SIZE</u>	<u>GPM RANGE</u>
1"	1 - 30
1 ½"	31 - 75
2"	76 - 150

7. Each drip remote control valve assembly shall contain the following components:
 - a. PVC ball valve.
 - b. Inline disc or screen filter with 100 micron/150 mesh filter element.
 - c. Remote control valve capable of operating at very low flow levels.
 - d. Inline pressure regulator.

All components shall be installed according to manufacturer's recommendations, and located within a single valve box, one valve per box (no multi-valve assemblies permitted).

D. Quick Coupling Valve Assembly:

1. Quick coupling valves shall be as specified in the Irrigation Equipment Schedule.
2. Quick coupling valves shall be heavy duty brass, two-piece, single lug locking cap.
3. The Contractor shall provide to the Owner at least 1 cap lock key and 1 quick

coupling key with a swivel hose bib attached. These keys shall be delivered prior to final acceptance of the project.

E. Manual Drain Valve Assembly:

1. All manual drains shall be three quarter (3/4) inch heavy duty brass ball valve.
2. Manual drain valves shall be required at all low points in the main lines. See plans, notes, and details.
3. The location of each manual drain shall be shown on the "as built" drawing with dimensions from the nearest permanent fixture, such as a building corner, etc.
4. Each manual drain valve will be accessed by a vertical two (2) inch PVC Schedule 40 pipe sleeve, capped by a locking valve cap with a key, enclosed within a ten (10) inch round green valve box with bolt down lid. The top of the drain sleeve shall be three to six (3 - 6) inches below the lid of the valve box.
5. Each manual drain shall empty into a gravel sump, a minimum of twenty-four (24) inches by twenty-four (24) inches by eighteen (18) inches deep, (or six (6) cubic feet total capacity). The gravel shall be washed three quarter (3/4) inch rock.
6. Contractor shall provide appropriate valve key to operate manual drain valve.

F. Automatic Drain Valves: Automatic drain valves shall not be used.

2.5 VALVE BOXES

- A. All valve boxes shall be green HDPE plastic with locking lid or approved equal.
- B. Valve box size shall be listed in the installation details for each irrigation system component.

2.6 BACKFLOW PREVENTION ASSEMBLY

- A. Backflow prevention device is shown in civil plans.

2.7 AUTOMATIC CONTROL SYSTEM

- A. Furnish a low voltage automatic control system manufactured expressly for the operation of automatic control valves used in an underground irrigation system.
- B. Automatic controller devices shall be as specified in the Irrigation Equipment Schedule. No substitutions shall be allowed. Install in enclosure, model as specified in the Irrigation Equipment Schedule.
- C. Provide adequate capacity to accommodate each valve on the system separately. Do not double valves to circuits.

- D. The Contractor shall provide 120-volt electrical service to the controller. Where required, install meter inside meter socket of the enclosure. Coordinate this work with the Owner and other trades involved in the project.
- E. Every controller shall be installed to control a single point of connection (P.O.C.). That point of connection shall be exclusively associated with that controller. Each P.O.C. assembly shall consist of the main line tap, reverse pressure backflow prevention device (if potable water source), filter (if required), master control valve (if specified), flow sensing device (if specified), manual drain valve, and quick coupling valve. No controller shall be wired to control valves which are connected to another P.O.C.

2.8 CONTROL VALVE WIRE

- A. All irrigation control wire shall bear approval as U.L. listed type of underground feeder (direct burial) and each conductor shall be of electrical conductivity grade solid copper in accordance with ASTM 30.
- B. No aluminum wire shall be used on this project.
- C. Wire size shall be #14 gauge minimum.
- D. Two spare wires shall be run from each controller to the farthest valve under its control in all directions and any valve which is on a dead-end line.
- E. All wire crossing water, attached to bridges, going under paving, or where conditions require protection, shall be housed in conduit or sleeves. All out-of-ground conduits shall be rigid metal. All buried conduit may be PVC.
- F. All splices shall be water-tight. All connections made inside the box to connect wires to the valve shall be made using a 3M DBR/Y dry-splice connector or pre-approved equal. Each connector shall be completely sealed and water-proofed.
- G. All other splices in control wire shall be housed in a separate valve box.
- H. The pigment or color of the wires shall be integrated into the covering, rather than painted on. All common or ground wires shall be white in color. Where more than one controller is required, a different colored hot wire shall be used for each controller. A separate color shall be used for all spare wires.

2.9 DRIP IRRIGATION

- A. Drip irrigation materials shall be as specified in the Irrigation Equipment Schedule.
- B. Emitters shall be of the individual, self-cleaning, pressure-compensating type.
- C. Dripline tubing shall be constructed of high quality linear, low density, UV-resistant, polyethylene resin materials with internal, integral emitters at specified intervals.
- D. All insert barbed fittings shall be constructed of molded, UV-resistant plastic. Each fitting

shall have a minimum of two (2) ridges or barbs per outlet. All fittings shall be from the same manufacturer and shall be available in one of the following end configurations:

1. Barbed insert fittings.
 2. Male pipe threads (MPT) with barbed insert fittings
 3. Female pipe threads (FPT) with barbed insert fittings.
- E. Each drip remote control valve assembly shall contain the following components (in required sequence):
1. PVC ball valve.
 2. Inline disc or screen filter with 100 micron/150 mesh filter element.
 3. Remote control valve.
 4. Inline pressure regulator.
- F. Provide the following equipment to each drip valve circuit, located and installed per manufacturer's recommendations:
1. Line flushing valve(s) - minimum of one (1) on each exhaust header, and one (1) on each supply header.
 2. Air/Vacuum relief valve(s) at all high points in the system if required by the manufacturer.

2.10 FLOW SENSING EQUIPMENT

- A. Where specified, each controller shall be installed with its own corresponding flow sensor on a single point of connection to the water source.
- B. The flow sensor shall be compatible with the specified controller.
- C. Size the flow sensor so that it is able to read the high and low flows of the valves used on that particular controller. Install per manufacturer's specifications.

PART 3 EXECUTION

3.1 GENERAL

- A. The irrigation plan is diagrammatic in nature, and some drafting liberties have been taken to maintain the graphic clarity of the drawings. All irrigation equipment shall be located in planting areas only, unless noted otherwise. The Contractor shall install piping to minimize changes in direction, avoid placement under trees or large shrubs, and avoid placement under hardscape features. Refer to the irrigation legend, details, and

- specifications for equipment and proper installation.
- B. Site Visit: The Contractor shall visit and inspect the project site. He shall take into consideration known and reasonably inferable conditions affecting the proposed work. Failure to visit the site shall not relieve the Contractor of furnishing materials and performing the work required. Any discrepancies between existing site conditions and those indicated on the plans shall be called to the attention of the Owner, by the Contractor, prior to continuance of the project.
- C. The Contractor shall keep the premises clean and free of excess equipment, materials, and rubbish incidental to work of this project. Work areas shall be swept clean and trash and debris picked up daily. Open trenches or hazards shall be protected with yellow caution tape. The Contractor is responsible for removal and legal disposal (off site) of trash and debris generated by his work on this project.
- D. Existing Landscapes:
1. Where existing landscape areas are a part of the project, the Contractor shall repair or replace work damaged by his irrigation system installation at his own expense. If the damaged work is new, the Contractor or the original installer of that work shall perform repairs at the Contractor's expense. The existing irrigation system and landscape shall remain in place, protected, undisturbed, and functional.
 2. The Contractor shall protect in place and work around all existing plant materials designated to remain.
 3. Coordination of trench and valve locations shall be laid out prior to any excavation work. Plant material deemed by the Landscape Architect or Owner's Representative to be damaged by the Contractor shall be replaced with new plant material at the Contractor's expense. The Contractor shall not cut existing tree roots larger than two (2) inches in diameter. Route pipe, wire, and irrigation components around tree canopy drip lines where possible to minimize damage to tree roots.
 4. The Contractor shall leave no part of the existing landscape without water for more than forty-eight (48) hours at a time.
- E. Pre-Construction Meeting: A pre-construction meeting shall be held prior to beginning any work on a project. The Owner and/or Owner's Representative, the project designer, and the Contractor and his Sub Contractors shall all be in attendance.
1. The purpose of this meeting is to review project goals and expectations, the project schedule, and all procedures relative to inspections, permits, and changes that may arise.
 2. In the pre-construction meeting, it shall be made clear that the construction documents (plans, details, specifications, and contract) shall be binding upon the Contractor and upon all of his work. Any work not in accordance with the plans and specifications shall be rejected, and the Contractor shall bring the project into compliance at his own expense.

3.2 CONSTRUCTION STAKING

- A. The Contractor shall provide the necessary staking to obtain the layout shown on the plans. The points of reference shall be as indicated in the drawings and shall include such features as the walks, buildings, curbs, etc. Any changes in the system which appear necessary due to field conditions must be called to the attention of the Owner/Owner's Representative and Landscape Architect and approved by the Owner at the time they are discovered and prior to making any changes.

3.3 EXCAVATION AND BACKFILLING

- A. Excavation:
 - 1. Excavation work shall only be as deep and as wide as will be required to safely perform the work, such as making mainline connections or forming vaults.
 - 2. Trenches shall be deep and wide enough to provide working space for placing two (2) inches of bedding underneath all new mainline pipe and fittings where the soil is rocky or gravelly. Place twenty (20) to thirty (30) inches of cover over the top of all pipe and fittings on main lines. All trench bottoms shall be sloped so the pipes will gravity-drain back to the main connection point or the nearest manual drain. If the existing main line is deeper than thirty (30) inches, the Contractor shall install a riser to a depth of eighteen (18) to thirty (30) inches and then install the new line at the required depth. At no time will the mainline be installed with less than eighteen (18) inches or greater than thirty (30) inches of cover unless prior approval is given by the Landscape Architect or Owner's Representative.
 - 3. Trenches shall be deep enough to maintain twelve (12) to fourteen (14) inches of cover over the top of all lateral line pipe and fittings. They shall be deep enough to guarantee that all swing joints drain back to the lateral lines. Trenches shall be a minimum of twelve (12) inches away from any walks and/or curbs, buildings, or other hardscape improvements. They shall be of sufficient width to accommodate tees and other fittings that come out sideways (horizontally) from the lateral lines. Lateral lines may be pulled by a mechanical puller provided all other applicable specifications are met.
 - 4. Any rocks or other debris over one (1) inch in diameter uncovered during excavation or trenching shall be removed from the area.
 - 5. If more than one (1) pipeline is required in a single trench, that trench shall be deep and wide enough to allow for at least six (6) inches of horizontal separation (if both are lateral lines), or six (6) inches of both horizontal and vertical separation (if one line is a main line) between pipes.
 - 6. Any existing utility lines damaged during excavating or trenching shall be reported immediately to the Landscape Architect, the utility Owner, and the project Owner. After proper notification to the Landscape Architect, the utility Owner, and project Owner, repairs to the damaged utility shall be made immediately. Repair materials

and methods shall meet industry standards and the utility Owner's satisfaction. Should utility lines be encountered which are not indicated on the plans, the Owner shall be notified. The repair of any damage shall be done as soon as possible by the Contractor or the utility Owner, and proper compensation to the Contractor shall be negotiated with the Owner. Such utility locations shall subsequently be noted on the "As-Built" drawings required before final payment of the irrigation system contract.

B. Backfilling:

1. No backfilling of trenches shall be done until the system has been inspected and approved by the Landscape Architect or Owner's Representative for proper trench depths, installation of equipment, control wire, and location of heads.
2. Before trenches are backfilled, the Contractor must show the Landscape Architect or Owner's Representative the redlined "As-Built" drawing he has been keeping on the site, indicating that changes and corresponding dimensions have been recorded where such changes have been made.
3. Prior to backfilling, the system shall be tested under pressure for leaks and general operation of the equipment. The main line shall be tested for a period of four (4) hours at a pressure of 120 PSI. Any failures detected during the testing period shall be repaired by the Contractor and the testing shall be repeated. The Landscape Architect shall certify the testing to ensure that it has been completed and that the system has met all testing requirements. All defects discovered by the pressurization and operation test shall be corrected by the Contractor at his own expense before proceeding with further work.
4. Trench bedding and backfill material shall be existing site soil free of rocks larger than one (1) inch in diameter and any other debris. Wasted pipe and other excess project materials or rubbish (tape, wire, trash, wrappers, boxes, bottles, etc.) shall not be backfilled into the trenches. All trenches shall be backfilled, and then watered sufficiently to insure no settling of the surface. In the event of any backfill settlement prior to the end of the guarantee period, the Contractor shall perform all required repairs at his own expense.
5. Backfill under and around the lines to the center line of the pipe shall be placed in maximum layers of six (6) inches and thoroughly compacted. Compaction shall be ninety-five (95) percent relative density (modified proctor) under walks and roads, and eighty-five (85) percent in planting areas.
6. Special care shall be taken to assure complete compaction under the haunches of the pipe. Backfill compaction under the haunches of the pipe shall be compacted to the original density. Compaction requirements above the pipe shall be the same as for surrounding areas.

3.4 POINT-OF-CONNECTION

- A. The Contractor shall verify the location of the irrigation point-of-connection (P.O.C.) and the static water pressure at that location prior to beginning any irrigation work. Verify water pressure during the time of day that the irrigation system is intended to operate.
- B. If the P.O.C. location or water pressure is different than that expressed by the irrigation designer, or if the pressure appears to be unusually high or low, the Contractor shall notify the Landscape Architect or Owner's Representative immediately prior to beginning any irrigation work.

3.5 ELECTRICAL POWER SUPPLY AND AUTOMATIC CONTROLLER

- A. If 120 volt ac electrical service is not already in place, the Contractor shall be required to make all necessary arrangements with the appropriate power company and provide all necessary materials and labor to provide said power, including but not limited to: paying fees, making power connections, providing poles, weatherhead and meter, etc., as specified on the plans or as required by the power company and the Owner. The automatic controller shall be of the type and manufacturer specified and located as shown on the drawings.

3.6 PIPE AND FITTINGS

- A. Install pipe to allow for expansion and contraction as recommended by pipe manufacturer. Where the main line sits uncovered for any length of time in the trench prior to testing, the main line shall be shaded with a thin covering of backfill soil to minimize weather-related expansion or contraction of the pipe. Do not cover up valves or other installed equipment prior to inspection and acceptance.
- B. The ends of all pipe shall be cut squarely and remain free of all inside scale or burrs. Threads shall be cut clean and sharp, and to a length equal to one and one eighth (1-1/8) times the length of the female thread receiving the pipe. The threaded pipe shall be screwed into a full length of the female thread.
- C. All threaded pipe joints shall be properly sealed using Teflon tape that is properly applied to the areas to be joined.
- D. Solvent weld joints shall not be glued unless ambient temperatures are at least forty (40) degrees F. Pipe shall not be glued in rainy conditions unless properly tented. Use only the brand and type of primer and glue specified. Glued main line pipe shall cure a minimum of four (4) hours prior to being energized. Lateral lines shall cure a minimum of two (2) hours prior to being energized and shall not remain under constant pressure unless cured for twenty-four (24) hours.
- E. Every care shall be taken during installation to prevent dirt and debris (especially rocks and pipe shavings) from getting into the pipes.
- F. All tees coming out of main lines for valves and other fixtures shall be vertical and constructed with Sch. 80 PVC pipe.
- G. All tees coming out of the lateral lines for heads and other fixtures shall be horizontal so that no direct weight or pressure may be exerted through the head to the top or bottom

of the lateral line pipe. Tees on lateral lines shall also be SxSxT to the head swing joints.

3.7 PIPE SLEEVES

- A. Pipe sleeves shall be required for all piping under all new concrete or other new paving. The size of the sleeve shall be at least twice the size of the pipe or wires to be sleeved. Wires shall be sleeved separately within their own sleeve. All pipe sleeves four (4) inches and smaller in diameter shall be PVC Schedule 40 pipe; sleeves greater than four (4) inches in diameter shall be Class 200 PVC, unless otherwise specified on the drawings.

3.8 VALVES

A. General:

1. Remote control valves, quick coupling valves, and manual drain valves shall be installed according to manufacturer's recommendations and these drawings and specifications.
2. Valve boxes shall be set over valves so that all parts of the respective valve assembly can be reached for service. Valve box and lid shall be set to be flush with the proposed finished grade.
3. No valve box shall rest directly upon the valve or any fixture associated with it, including main line and lateral lines. Each valve box shall be centered on the valve assembly it covers. Each valve box shall have four (4) inches of three quarter (3/4) inch gravel placed in the bottom underneath the valve and lines to reduce the potential of mud and standing water therein.

B. Remote-Control Valve:

1. Each control valve shall have its own gate or ball valve (as specified), and only one (1) control valve and ball valve per valve box. No valve manifolds shall be allowed.
2. The bottom of the remote-control valve shall be a minimum of four (4) inches above the gravel.
3. All control valves shall be located within shrub areas where possible and installed per the details on the plans. No large grouping of valves (greater than 3) in any one spot shall be allowed, unless approved by the Landscape Architect or Owner's Representative.
4. Control valve assemblies shall be installed no closer to one another than two (2) feet.
5. No control valve shall be installed more than twelve (12) inches below finished grade.
6. Tag each control valve with a permanent and non-smearing label indicating its proper controller and valve number as shown on the irrigation plans.

- C. Quick Coupling Valve:
 - 1. Quick coupling valves shall be installed within a ten (10) inch round green plastic valve box, with the top of the valve box at finished grade.
- D. Manual Drain Valve:
 - 1. Manual drain valves shall be installed within a ten (10) inch round green plastic valve box, with the top of the valve box at finished grade.

3.9 VALVE BOX

- A. Where indicated in the installation details, valve boxes shall rest on concrete pavers only, thus eliminating any weight or pressure from being exerted on the main line or valve inside the valve box. There shall be a minimum of three (3) inches of clear space between the bottom of the valve box lid and the topmost part of the valve (including solenoid).
- B. Valve box extensions shall be used where necessary to prevent soil around the valve from collapsing into the space inside the valve box.

3.10 BACKFLOW PREVENTION ASSEMBLY

- A. Install per details on civil plans.

3.11 WIRE & CABLES

- A. Multiple wires in the same trenches shall be banded together at ten (10) foot intervals for protection. Where wires pass under paved areas, they shall be installed in Schedule 40 PVC sleeves, separate from lateral or main lines. These sleeves shall be installed prior to installation of the paving, if possible, and prior to installation of the wires. Sleeves for fourteen (14) gauge wires shall be sized as follows:

<u>NUMBER OF WIRES</u>	<u>SLEEVE SIZE</u>
1 - 10.....	1"
11 - 18.....	1 1/4"
19 - 25.....	1 1/2"
26 - 40	2"

- B. All control wires shall be bundled and taped together every ten (10) feet and installed in the pipe trench directly adjacent to the pipe. Control wires not placed in the trenches adjacent to the pipes shall be placed in PVC electrical conduit and buried eighteen (18) inches or deeper and marked on the "as built" drawings.
- C. Two (2) spare wires shall be run from each controller to the farthest valve under its control in all directions and to any valve which is on a dead-end line. The spare wires shall be a different color from the regular wires and shall be labeled at both ends. Each spare wire shall be brought up to the surface in each valve box it passes through and coiled with twenty-four (24) inches for use in future connections. Each spare wire shall be tested for

continuity prior to final acceptance of the project and guaranteed by the Contractor to be functional. Should the maintenance personnel discover a defect within one (1) year afterwards, the Contractor shall locate the problem and cause it to be repaired at his own cost. Install extra wires as needed for moisture sensors (if used).

- D. Run a single 14-gauge wire along the top of the main line to be used for tracking the location of the main line. The color of the tracing wire shall be different than any other wire color used.
- E. All wires shall be installed with twenty-four (24) inches of excess wire (coiled) at the end of each wire run, wire splice, and at each controller.
- F. Isolation valves, quick coupling valves, manual drain valves, and wire splices not specifically associated with the control valve shall be located in separate valve boxes.

3.12 INLINE DRIP SYSTEM

- A. Inline drip tubing shall be spaced approximately equal to the inline emitter spacing. Inline drip tubing spacing may be adjusted to be slightly less than the emitter spacing in order to achieve uniform spacing. For slope applications, place drip tubing laterals parallel to the slope contour. When slopes exceed thirty (30) percent, increase the recommended lateral spacing by twenty-five (25) percent on the lower one third (1/3) of the slope.
- B. Inline dripper tubing shall be installed at finished grade with soil staples and covered with three (3) inches of specified mulch. Supply and exhaust headers shall be installed at normal lateral line depths.
- C. All drip tubing shall be held in place by soil staples and shall conform to the following:
 - 1. Sandy Soil - One staple per every three (3) feet and two (2) staples on each change of direction (tee, elbow, or cross)
 - 2. Loam Soil - One staple every four (4) feet and two (2) staples on each change of direction (tee, elbow, or cross)
 - 3. Clay Soil - One staple every five (5) feet and two (2) staples on each change of direction (tee, elbow, or cross)
- D. Installation of inline drip circuits shall generally conform to the following steps:
 - 1. Assemble and install ball valve, filter, remote control valve and pressure regulating valve assembly in accordance with installation details.
 - 2. Assemble and install supply header(s) in accordance with installation details. Tape or plug all open connections to prevent debris contamination.
 - 3. Install lateral drip lines in accordance with details and relevant specifications and manufacturer's recommendations. Tape or plug all open ends while installing to prevent debris contamination.

4. Assemble and install exhaust header(s) in accordance with installation details. Tape or plug all open connections to prevent debris contamination.
5. Install air/vacuum relief valve(s) at the zone's highest point(s) in accordance with installation details.
6. Thoroughly flush supply header(s) and connect drip lateral lines while flushing.
7. Thoroughly flush drip lateral lines and connect to exhaust header(s) and any interconnecting lateral lines while flushing.
8. Thoroughly flush exhaust header(s) and install line flushing valves in accordance with details.

3.13 AS-BUILT DOCUMENTS

- A. The Contractor shall keep a current and accurate record of exact dimensioned locations, grades, elevations, and size of all exterior and interior underground piping, valves, and drains. Dimensions shall indicate distances from columns, buildings, curbs, and similar permanent features on the site. This information shall be recorded on a print as the work progresses but shall be permanently recorded on a reproducible two (2) mil Mylar or Tyvek original which shall be given to the Owner before the project is accepted. The Mylar or Tyvek shall be a copy of the original plans for the project produced by a local printer at the Contractor's expense.
- B. Final payment for the contract will not be processed until "As-Built" drawings or plans are received by the Owner.

3.14 OPERATIONAL TEST AND MAJOR INSPECTIONS

- A. Substantial Completion:
 1. At substantial completion of the irrigation system, the Contractor shall call for an operational and coverage test. Substantial completion shall be defined as the complete installation of all irrigation equipment and completion of all backfilling and grading operations in their entirety. Substantial completion shall not be given for designated portions of the project.
 2. Notice by the Contractor shall be given, in writing, at least three (3) days in advance to the Owner so that proper scheduling can be made for those who are to attend.
 3. At the appointed time, an inspection of all irrigation equipment, including control valve assemblies, controllers, isolation valves, quick coupling valves, drain valves, and sprinklers shall be made. The entire system will be tested for operation, coverage, and head adjustment. Please note that the pressure testing of the main lines shall already have been completed prior to this time.
 4. A list of uncompleted items or repairs (punch list) shall be generated by the Owner

and distributed to the Contractor and other involved parties within three (3) days of the operational testing. Each item on the punch list shall be corrected before the system will be approved and accepted by the Owner. The Contractor will be back charged for time spent by the Owner and any consultants who have been brought to the site for a final inspection when the project is not ready for said inspection.

B. Maintenance/Establishment Period:

1. The duration of the irrigation maintenance period shall be equal to the plant maintenance/establishment period. It shall begin one (1) day after the substantial completion inspection. The Contractor shall complete all punch list items during the maintenance period, as well as maintain and operate the entire irrigation system.
2. The irrigation Contractor (if different than the landscaping Contractor) shall coordinate with the landscaping Contractor during the entire plant and lawn establishment period on the use, scheduling, and maintenance of the sprinkler system.
3. The maintenance period shall not end until Final Acceptance of the project.

C. Final Acceptance:

1. A second inspection shall be held at the end of the maintenance period to ensure that all punch list items have been completed and the entire system is ready for acceptance by the Owner.
2. Upon satisfaction that the Contractor has completed all punch list items, the irrigation system is fully and completely functional, and the required As-Built drawings (Mylar or Tyvek) and maintenance manuals have been submitted, the Owner shall accept the project.
3. An official letter of final acceptance shall be prepared and issued by the Owner to the Contractor and Landscape Architect. Upon acceptance of the system by the Owner, the Owner shall assume full responsibility for the system, and the guarantee period shall begin.

3.15 GUARANTEE AND MAINTENANCE

A. Guarantee:

1. Upon final acceptance of the irrigation system as being operational and properly installed, the Contractor shall guarantee the workmanship, materials, fixtures, and equipment to be free from defects for a period of one (1) year after that date.
2. The Contractor shall insure and guarantee complete drainage of the system. In working with or connecting to an existing system, the Contractor shall guarantee compatibility in operation and drainage between the two systems.

B. Maintenance Required During Guarantee Period:

1. In the fall of the year during the installation and guarantee period, the CONTRACTOR shall meet with the Owner's maintenance personnel on the site. The Contractor shall winterize the system by draining all of the water and doing everything necessary to insure protection of the system until spring. Blowing out the lines by compressor shall be permitted during the one (1) year guarantee. Maximum compressor pressure shall be 30 psi on spray circuits, 50 psi on rotor circuits, and 20 psi on all drip circuits. The individuals involved from both parties shall exchange all information necessary for the eventual take-over of the system by the Owner.
2. The Contractor, with the Owner's maintenance personnel and Owner in attendance, shall energize the sprinkler irrigation system again the following spring and shall repair all defects found as a result of winter damage, improper installation, improper maintenance, defective materials or inadequate sprinkler drainage.
3. At the end of the guarantee period, when the lawn and landscaping have been accepted, the Contractor shall call for a final inspection of the sprinkler irrigation system. There shall be at least five (5) days prior notice given in writing to the Owner so the appropriate people have opportunity to attend.
4. Prior to that time, the Owner shall adjust all heads to their proper pattern, radii, and height. The system shall have been flushed out, checked for operation, and any defects covered by the guarantee shall be repaired. The entire system shall be inspected and checked to determine if everything is in working order. A final list of warranty items found in need of correction (if any) shall be made and the Contractor shall correct them. The Contractor shall notify the Owner when he has verified that every item is corrected.
5. After all warranty items have been corrected, the Owner shall, in writing, officially release the Contractor from all warranty claims pertaining to the irrigation system and assume full and complete responsibility for said system.

END OF SECTION

**SECTION 02891
PLANTING**

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Trees, shrubs, perennials, vines, and groundcover requirements.
2. Bedding, topsoil, and temporary support.

B. The work to be performed under this section shall consist of furnishing all materials, labor, and plants necessary for the proper planting of all trees, shrubs, perennials, vines, and groundcovers of the kind and sizes specified at the prescribed locations, and otherwise in accordance with the drawings and specifications or as directed by the Landscape Architect or Owner's Representative or Owner's Representative.

C. Related sections:

1. Section 02890 Underground Irrigation Systems

1.2 REFERENCES

- A. AAN: American Associations of Nurserymen, Inc.
- B. ANSI Z60.1-2004: American Standard for Nursery Stock.
- C. FS O-F-241: Fertilizers, Mixed Commercial.
- D. ICBN: International Code of Botanical Nomenclature.
- E. City Standards/Ordinances relating to Irrigation and Landscaping.

1.3 QUALITY ASSURANCE

- A. Perform work in conformity with applicable requirements of AAN.
- B. Upon receiving Notice to Proceed, the Contractor shall provide written proof that the specified plant material is available and has been secured or reserved specifically for this project. Obtain nursery stock and other plant materials from reliable and stable sources prior to order and delivery.
- C. Provide plants that are declared free of disease and insect pests.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Exercise care in digging, transporting, handling, and packing of all plants.

- B. Handle plants so roots are protected at all times. If delivery is in open vehicles, cover entire load without causing over heating.
- C. Deliver plant material immediately prior to placement. Keep plant material moist.
- D. Protect root balls from sun and wind by covering with soil or other suitable material if not planted immediately on delivery.
- E. Store fertilizer in a weatherproof location such that its effectiveness will not be impaired.

1.5 ACCEPTANCE

- A. Plants shall not be accepted if the ball of earth surrounding roots (rootball) has been cracked or broken.
- B. Plants shall be accepted if burlap, staves, and ropes required in connection with transplanting are installed and still intact upon delivery.
- C. Heeled in stock from cold storage shall not be accepted.

1.6 SAMPLES

- A. Samples of the topsoil, bark mulch, fertilizer, and tree ties listed below shall be submitted to the Landscape Architect or Owner's Representative for inspection and approval prior to the beginning of work under this contract.
- B. Delivery of materials may begin only after samples have been approved. All materials furnished for the work shall conform in every respect to the approved samples. Any non-conforming materials will be rejected.

PART 2 PRODUCTS

2.1 GENERAL

- A. The planting plan is diagrammatic, and all plant locations are approximate. Plant symbols take precedence over plant quantities shown on the plans and in the plant material schedule. The Contractor shall verify all plant quantities and notify the Landscape Architect or Owner's Representative of any discrepancies between the quantities and the symbols shown.
- B. Provide plants of normal growth and uniform height, according to species, with straight canes and well developed leaders, roots, and tops.
- C. Provide plants of sizes indicated. The size stated in each case shall be interpreted to mean dimensions of plant as it stands in its mature position in the nursery without straightening of any branches or leaders.
- D. Provide legible labels attached to all plants, specimens, bundles, boxes, bales, or other containers indicating botanical genus, species, and size of each.

- E. Plants cut back from larger sizes to meet specifications shall be rejected.
- F. Balled and burlapped deciduous shrubs may be acceptable in lieu of container growth deciduous shrubs only if there is a demonstrated significant shortage of container grown stock.

2.2 PLANTS

- A. All plants shall comply with federal and state laws requiring inspection for plant disease and infestations.
- B. Any inspection certificates required by law shall accompany each delivery of plants and such certificate shall be given to the Landscape Architect or Owner's Representative. All plants shall be subject to inspection and approval at the place of growth or upon delivery to the site for their quality, size, species, and variety. Such approval shall not impair the right of inspection and rejection at the site or during progress of work for size and condition of the plants, latent defects, or injuries. Any and all rejected plants shall be removed immediately from the premises by the Contractor. The Contractor shall make all replacements at his expense should he fail to comply in full with any of the specifications. Necessary replacements will be made as soon as weather conditions permit, and all such plants replaced shall conform to all specifications herein.
- C. Names and Grades:
 - 1. Plant names shall conform to the nomenclature of "Standardized Plant Names," "International Code of Botanical Nomenclature (ICBN)," or "International Code of Nomenclature for Cultivated Plants." When a name is not found in any of these references, consult the accepted name used in the nursery trade. All plants shall be tagged by the nursery with the proper identification labels to insure the correct varieties of plants.
 - 2. Size and grading standards shall conform to those of the American Association of Nurserymen, Inc., as published in "American Standard for Nursery Stock", 2014 Edition, with all current revisions unless otherwise specified.
 - 3. The caliper of trees shall be measured six (6) inches above the surface of the ground.
 - 4. Measurements on all trees and shrubs shall be taken with the branches in a normal position. Height and spread dimensions specified refer to the main body of the plant and not from branch or root tip to tip. No trees which have had their leaders cut, or are so damaged that cutting is necessary, will be accepted.
- D. No substitution of size, grade, variety or any species shall be permitted except by written permission of the Landscape Architect or Owner's Representative.
- E. Plant Size:
 - 1. All plants shall conform to the size, age, and condition as specified in the plant list shown on the drawings. Undersized plant material shall not be approved.

2. No additional compensation shall be due the Contractor if larger than specified plant material is provided.
3. Only balled and burlapped or container stock shall be accepted. No bare root stock shall be accepted.
4. Plants cut back from larger sizes to meet specifications shall be rejected.

F. Plant List:

1. Plants lists indicate minimum size requirements only. Plant materials shall be equal to or greater in size than those specified.
2. Any discrepancies between plant lists and plans shall be immediately brought to the attention of the Landscape Architect or Owner's Representative.
3. In all cases the Contractor shall be held responsible for all plant materials indicated on the plans unless otherwise directed in writing by the Landscape Architect or Owner's Representative.
4. Each bidder shall investigate sources of supply and satisfy himself that he can supply all of the plants mentioned in the planting lists in size, variety, and quantity noted and specified before submitted his bid. Failure to take this precaution will not relieve the successful bidder from his responsibility as Contractor to furnish and install all plant material in strict accordance with the contract requirements without additional expense to the owner.
5. If a shortage of the specified plant material truly exists and can be verified by the Contractor, the Contractor shall notify the Landscape Architect immediately and discuss what varieties and sizes are available as a suitable substitution. Last minute substitutions are not acceptable.

- G. All plants shall be fresh and vigorous, of normal habit and growth, and free of disease, insects and insect eggs and insect larvae, weeds and weed seed. No heeled-in plants from cold storage shall be accepted except on approval by the Landscape Architect or Owner's Representative prior to installation.

2.3 TREE STAKES & TIES

- A. Tree stakes shall be two by two (2x2) inch square or two (2) inch diameter round wood stakes ten (10) feet in length as indicated on the plans. Steel stakes may not be used.
- B. Tree stake ties shall be manufactured of virgin flexible vinyl meeting ASTM-D-412 standards for tensile and elongation strength. The material shall be black in color for ultraviolet resistance. Hose and wire shall not be used.

2.4 TOPSOIL

- A. All planting areas shall receive either a minimum of four (4) inches of stockpiled or imported topsoil in turf areas and twelve (12) inches in planting beds.

- B. All topsoil used on this project (stockpiled or import) shall meet the following criteria:
1. pH: 5.5 - 8.0
 2. EC (electrical conductivity): <2.0 mmhos per centimeter
 3. SAR (sodium absorption ratio): <3.0
 4. % OM (percent organic matter): $\geq 2\%$
 5. Nitrogen (NO₃N) 48 ppm min.
 6. Phosphorous (P) 11 ppm min.
 7. Potash (K) 130 ppm min.
 8. Iron (Fe) 5.0 ppm min.
 9. Texture (particle size per USDA classification):
 - a. Sand: <70%
 - b. Clay: <30%
 - c. Silt: Balance
 10. Stone Fragments (gravels or any soil particle greater than two (2) mm in size): <5% (by volume)
 11. Rocks Present > 1.5" None
- C. In addition, the topsoil shall be fertile, friable, natural loam and shall be capable of sustaining vigorous plant growth. It shall be free of stones, lumps, clods of hard earth, plants or their roots, sticks, and other extraneous matter. The topsoil shall contain neither noxious weeds nor their seeds. It shall not be used for planting operations while in a frozen or muddy condition.

2.5 MULCH

- A. Crushed rock mulch shall be used as a top dressing for all planting beds unless specified otherwise.
- B. Crushed rock mulch shall conform to the following criteria:
1. Rock pieces shall not exceed $\frac{3}{4}$ " inches when passed through a screen of that size.
 2. Large chunks of rock shall not be mixed in with the mulch.
 3. Rock pieces smaller than $\frac{1}{2}$ " shall not be allowed.
- C. Where used, the rock mulch shall be place to a depth of three (3) inches on top of the topsoil.

- D. Other mulches may be used only as specified on the drawings or in the planting notes and details.

2.6 FERTILIZER

- A. Commercial fertilizer shall be uniform in composition, dry, and free flowing. Deliver fertilizer mixed as specified in bulk or bag, showing weight analysis, formula, and manufacturer's name.
- B. A 16-16-16 balanced fertilizer shall be used. Any exceptions to this formula shall be based on horticultural recommendations resulting from a site-specific soils test and must be approved prior to application by the Landscape Architect or Owner's Representative.

2.7 MOWSTRIP

- A. Where turf areas are separated from planting beds, a concrete mowstrip shall be used. No other edging materials may be used unless specifically noted on the plans and approved by the Landscape Architect or Owner's Representative.
- B. The mowstrip shall be constructed using concrete having a compressive strength rating of two thousand five hundred pounds per square inch (2,500 psi) or greater, and a maximum slump of four (4) inches.
- C. A three eighth (3/8) inch diameter rebar (#3) shall be placed continuously in the center of the mowstrip to provide support and help prevent differential settling of the mowstrip after cracking. Overlap joints a minimum of twelve (12) inches.
- D. Include a concrete mowstrip at the base of all fences. Said mowstrip shall be six (6) inches deep and eighteen (18) inches wide, with the fence posts located in the center of the mowstrip.

PART 3 EXECUTION

3.1 GENERAL

- A. Site Visit: The Contractor shall visit and inspect the site. He shall take into consideration known and reasonably inferable conditions affecting work. Failure to visit the site will not relieve the Contractor of furnishing materials and performing the work required.
- B. Prior to any planting operations, the irrigation system shall be fully operational and all planting areas shall be thoroughly moistened.
- C. Where weeds or other undesirable vegetation are present in planting areas, the Contractor shall apply a contact herbicide a minimum of ten (10) days prior to commencement of any planting or irrigation work. Apply herbicide per manufacturer's recommendations. The poisoned vegetation shall be allowed to completely die back, including the roots, before proceeding with the work. Dead vegetation shall then be removed from the site and disposed of in a legal manner.
- D. The Contractor shall conform to the following requirements with regard to existing

vegetation:

1. The Contractor shall be fully responsible for any damage to existing trees or shrubs. He shall use all reasonable means to protect and preserve plants on the project not designated for demolition.
2. No pruning, thinning, or cutting of existing vegetation shall be allowed unless written permission is given by the Landscape Architect or Owner's Representative.
3. The Contractor shall replace any trees or existing shrubs damaged by him or his sub-contractors with like kind and size.

3.2 PLANTING SEASONS

- A. All new plant installation shall be completed between April 15 and October 15. If planting must be done after October 15 or before April 15, the Contractor shall obtain specific approval to do so from the Landscape Architect or Owner's Representative prior to beginning any planting operations.
- B. No planting shall be done in frozen soil or during unfavorable weather conditions, subject to the approval of the Landscape Architect or Owner's Representative.

3.3 TOPSOIL

- A. The Contractor shall obtain a soil analysis from any authorized soil testing agency of any existing stockpiled or imported topsoil to be used on the project to verify that it conforms to the topsoil specifications. Test results shall include horticultural recommendations. The soil samples shall be obtained per the testing agency directions. Allow ten (10) working days to obtain test results. The costs for such testing shall be the responsibility of the Contractor.
- B. Prior to delivery of the imported topsoil to the site, the Contractor shall provide to the Landscape Architect or Owner's Representative the name and location of the topsoil source, along with the certified soil analysis of the topsoil to be used. The analysis shall verify that the proposed topsoil meets the topsoil specifications and is capable of supporting healthy plant growth.
- C. After imported topsoil has been delivered to the site, a second soil test may be required to verify that it is indeed the same soil as previously tested and designated for use in this project. No substitution of topsoil shall be allowed without prior written authorization from the Landscape Architect.
- D. The following procedure shall be followed in placing all topsoil:
 1. All cut areas to receive topsoil which have a slope of less than ten (10) percent shall be cross-rippled to a depth of two (2) to four (4) inches.
 2. The subgrade material shall be rough graded to plus or minus one tenth (± 0.1) foot of the final rough grade, which will allow the Contractor to achieve final finished grade through the placement of the topsoil.

3. The surface of the subgrade shall be scarified to a depth of two (2) inches to provide a transition zone between the subgrade and the topsoil. Place the topsoil on the subgrade and fine grade to the final finished grade and topsoil depths as indicated on the drawings and in these specifications.
 4. Any required soil amendments (i.e. mulch, organic matter, etc.) shall be placed directly on the topsoil at the required rates and spread evenly over the planting area. The amendments shall then be thoroughly blended into the topsoil to a depth of four (4) inches. Where only a dry, granular fertilizer is to be added, it may be applied to the surface and raked in during the fine grading procedures.
- D. The Contractor shall maintain a minimum of two (2) percent drainage away from all buildings, structures, and walls. Finished grades shall be smoothed to eliminate puddling or standing water.
 - E. All finished grades shall be approved in writing by the Owner prior to installation of any plant materials.

3.4 PLANT CONDITION

- A. All precautions customary in commercial landscape installation practice shall be taken in preparing plants for planting. Workmanship that fails to meet these minimum standards shall be rejected. All balled and burlapped plants shall have firm and natural balls of earth around their roots. No plant shall be planted if the rootball is cracked or broken, either before or during the process of planting. Loose, broken or manufactured root balls shall be rejected.
- B. All plants materials in five (5) gallon containers or larger shall have been established in that container for a period of not less than six (6) months and not more than two (2) years. Plant material shall not be root bound. They shall exhibit sound, healthy, and vigorous growth and be free from diseases and pests.
- C. The Contractor shall have the Landscape Architect or Owner's Representative approve plant material size and quality prior to installation. Any plants which are not true to form, appear stressed or unhealthy, are infested with pests, infected with disease, or are undersized for their containers shall be rejected.
- D. All plant material shall be planted as soon upon arrival on the premises as possible. If planting cannot be done immediately, the roots shall be protected from the sun and kept in a moist condition until the time of planting. Such protection may be provided by laying the plants on the north side of the building and covering the roots with wet straw.
- E. If it is anticipated that planting will not be done for more than twenty-four (24) hours after the arrival of plants upon the premises, the balled and burlapped stock shall be heeled-in on the north side of a building and all roots completely covered with dirt which shall be wetted down frequently. Care will be taken in the handling of all ball and burlap materials so that the earth around the roots is disturbed as little as possible.

3.5 PLACEMENT OF PLANTS

- A. Plants shall be generally located as indicated by the drawing. The Contractor shall stake out the location of all plants and planting areas with identified plant stakes, and no excavation shall commence until such locations have been approved by the Landscape Architect or Owner's Representative or Owner's Representative.
- B. In the event that underground construction work or obstructions are encountered during excavation of the plant holes, alternate locations will be assigned and approved by the Landscape Architect or Owner's Representative or Owner's Representative.
- C. Except for turf and groundcovers, plants shall not be placed within twenty-four (24) inches of sprinkler heads.
- D. The Contractor must locate and stake any sprinkling head or valve box within the dripline of a proposed or existing tree location and must establish the direction of the lateral or main irrigation line that serves the staked sprinkler head or valve box. This procedure will help eliminate damage to existing or future tree roots.

3.6 PLANT INSTALLATION

- A. All concrete work, sprinkling systems, and finished grading shall be completed and approved by the Landscape Architect or Owner's Representative before any planting of the specified plant materials is begun.
- B. No tree planting shall be initiated until sprinkling system is complete and tested. However, tree planting shall precede lawn planting.
- C. Each plant will be placed in an individual plant pit. The sharing of pits shall not be allowed.
- D. All trees and shrubs shall be planted in pits as detailed in the planting details contained herein or as noted on the drawings. Tree and shrub pits shall be circular in outline, with a diameter at least two (2) times the diameter of the rootball of each plant to be installed. They shall be one to two and one half (1 - 2 ½) inches shallower than the rootball depth. When the plant is properly placed in the plant pit, the root collar shall be approximately one (1) inch above finished grade of the topsoil. For perennial plants (which have no root collar), the top of the rootball shall be even with the finished grade or the topsoil. The sides of the plant pit shall be roughened, and not smooth or sculpted.
- E. Plant backfill mix shall be one hundred (100) percent native site soil.
- F. For container grown plants, remove the container and place the plant vertically in the plant pit, directly on undisturbed soil. The root crown or collar shall be at or just above the finished grade. Perennial and ornamental grass plants shall be planted with the root collar at finished grade.
- G. For balled and burlapped plants, place the plant vertically in the center of the pit, with the rootball resting on undisturbed soil. Cut and remove the wire basket and burlap or other wrapping material from the rootball. This may be done with the rootball in the pit. Any

burlap or wire pieces underneath the rootball may be left in place if they cannot be removed. Do not fold the burlap over but cut away as much as possible without disturbing the rootball. No burlap shall be pulled from under the rootball. Backfill the bottom one third (1/3) of the pit as the wire and burlap are removed. In all cases, maintain the integrity of the rootball.

- H. Specified backfill material shall be carefully and firmly worked and tamped under and around the rootball to fill all voids. When backfilled and compacted to two thirds (2/3) the depth of the pit, thoroughly water with a hose to completely soak the roots and remove any air pockets.
- I. The plant pit shall then be completely backfilled with the specified backfill mix and tamped well. A shallow watering basin or rain cup shall be formed around each plant. This basin will be equal in diameter to that of the original planting pit.
- J. Monitor all plants to ensure that no settling occurs. Pits which settle shall be immediately filled with additional soil mixture at no additional expense to the Owner.
- K. After planting, the following operations shall be performed:
 - 1. Stake and mulch all trees per installation details.
 - 2. Remove all nursery stakes ties, and tags from all plants. Prune and remove any dead, damaged, or broken branches. Maintain side growth on all trees.

3.7 STAKING

- A. All trees, including evergreen trees, shall be staked.
- B. Staking shall be performed as follows:
 - 1. Two (2) 2"x 2" square or 2" diameter round wood stakes, ten (10) feet in length, shall be used to support each tree planted under this contract unless otherwise indicated.
 - 2. Tree ties shall conform to the staking detail shown on the planting detail sheet.
 - 3. Each stake will be located adjacent to the rootball, on opposing sides, to provide maximum support to the trunk. Do not penetrate the rootball with the stake.
 - 4. The stakes will be driven into the pit bottom after the tree has been placed in the pit, but before backfilling begins so as to avoid damage to the roots.
- C. Stakes and ties shall be removed after one (1) full growing season from the time the tree was installed.

3.8 WATERING

- A. All plants shall be thoroughly watered immediately after planting. This shall mean full and thorough saturation of all backfill in the pits and beds during the same day of planting.

Water shall be applied only by open end hose at very low pressure to avoid creating air pockets, causing injury to the plant, or washing away of backfill. When installed, watered, and fully settled, the plants shall be vertical with the root collar at the appropriate level.

- B. Subsequent watering shall be provided by the site's irrigation system. The Contractor shall insure that all plants, especially trees, receive sufficient water to maintain healthy growth and vigor. Overwatering shall be avoided, and prolonged saturation of the soil around the trees shall be eliminated by appropriately controlling the irrigation circuit which provides water to that area.

3.9 MULCHING

- A. Rock mulch shall be placed to a depth of three (3) inches on top of the topsoil in all planting beds and over tree planting pits.
- B. The finished grade of the rock mulch shall be as follows:
 - 1. Two (2) inches below the surface or finished grade of any paving, mowstrips, or walks adjacent to the planting area.
 - 2. At adjacent finished grade of the turf surrounding tree planting pits.
- C. Just prior to placement of the mulch, the Contractor shall treat the mulched areas with a pre-emergent herbicide according to the manufacturer's recommendations.

3.10 CLEAN UP

- A. Throughout the course of planting, excess and waste materials as well as excavated subsoil shall be continuously and promptly removed. All areas shall be kept clear and all reasonable precautions taken to avoid damage to existing structures, plants, and grass.
- B. When planting has been completed in an area, it shall be thoroughly cleaned of all debris, rubbish, subsoil, and waste materials. These shall be removed from the property and disposed of legally. All planting tools shall also be put away.
- C. The ground surface shall be left in a condition satisfactory to the Landscape Architect or Owner's Representative.

3.11 AS-BUILT DOCUMENTS

- A. The Contractor shall keep a record of all departures from the working drawings that occur during construction. These changes shall be shown on a clean set of prints, and the prints kept on the job site at all times for review.
- B. As a part of his observation work, the Landscape Architect or Owner's Representative shall review the as-built drawings regularly to verify that changes are being recorded. At the conclusion of the work, the Contractor shall present to the Owner fresh, clean drawings of all the changes made and recorded previously and they shall become part of the permanent record of the project.

3.12 MAINTENANCE

A. Substantial Completion:

1. At Substantial Completion of all planting work outlined in these plans, the Contractor shall contact the City to arrange for a walk through to verify that all aspects of the work have been completed. Work must be fully completed (except for final clean-up) according to all plans, notes, and specifications and exhibit professional workmanship. Substantial completion shall be defined as the complete installation of all plant materials, staking, mulching, and other work on the project in its entirety. Substantial completion shall not be given on designated portions of the project.
2. Notice by the Contractor shall be given, in writing, at least three (3) days in advance to the Landscape Architect or Owner's Representative so that proper scheduling can be made for those who are to attend.
3. At the appointed time, an inspection of all plant materials, including staking and mulching, shall be made.
4. A list of uncompleted items (punch list) shall be generated by the Landscape Architect or Owner's Representative and distributed to the Contractor and other involved parties within three (3) days of the substantial completion inspection. Each item on the punch list shall be corrected before the project will be approved and accepted by the Landscape Architect or Owner's Representative. The Contractor will be back charged for time spent by the Owner and any consultants who have been brought to the site for a final inspection when the project is not ready for said inspection.

B. Maintenance/Establishment Period:

1. The maintenance/establishment period shall begin one (1) day after the substantial completion inspection. The Contractor shall complete all punch list items during this period, as well as maintain and operate the entire irrigation system.
2. In cases where the maintenance/establishment period runs beyond October 15 of any given year, the balance of the maintenance/establishment period days shall be extended into the spring of the following year. Counting of the balance of days shall begin no sooner than April 15, unless mutually agreed upon by both the Contractor and the City prior to that date. Early counting shall be based on weather conditions at the time.
3. The Contractor shall maintain all plantings until the turf is fully established. The turf shall be considered fully established when grass stands come in uniform and thick, with no bare or thin spots, and roots have begun to spread and knit together. No weeds shall be allowed in the grass. If the turf grass is hydroseeded, the Contractor must complete the hydroseeding by September 1. The maintenance/establishment period shall be a minimum period of sixty (60) days.
4. The maintenance work required shall include but not be limited to the following:

- a. Appropriate watering of all plant materials.
 - b. Weeding and removal of all weeds from groundcover and planting areas.
 - c. Replacement of any dead, dying, or damaged trees, shrubs, perennials, or groundcover.
 - d. Filling and replanting of any low areas which may cause standing water.
 - e. Adjusting or sprinkler head heights and watering patterns.
 - f. Filling and recompaction of eroded areas, along with any required reseeding and/or replanting.
 - g. The grass shall be mowed when the blades reach three (3) inches tall and maintained to a minimum height of two (2) inches. No more than one third (1/3) of the blade shall be removed per cutting. The cutting frequency shall be once every five (5) to seven (7) days depending upon grass height and growth rate.
 - h. Weekly removal of all trash, litter, clippings, and all foreign debris.
 - i. At thirty (30) days after planting, a balanced fertilizer (16-16-16) shall be applied to the grass areas at a rate of one half (½) pound of nitrogen per one thousand (1,000) square feet.
 - j. At intervals of thirty (30) days after the first application of fertilizer to the grass, apply a balanced fertilizer (16-16-16) at a rate of one half (½) pound of nitrogen per one thousand (1,000) square feet until the grass is established.
5. The maintenance period shall not end until Final Acceptance of the project.

C. Final Acceptance:

1. A final inspection shall be held prior to the end of the maintenance period to ensure that all punch list items have been completed and the entire project is ready for acceptance by the Owner.
2. Upon satisfaction that the Contractor has completed all punch list items, the irrigation system is fully and completely functional, and the required As-Built drawings, mylars and maintenance manuals have been submitted, the Owner shall accept the project.
3. An official letter of final acceptance shall be prepared and issued by the Owner to the Contractor, designer, and the Landscape Architect. Upon final acceptance of the project by the Landscape Architect or Owner's Representative, the Owner shall assume full responsibility for the project, and the guarantee period shall begin.

3.13 GUARANTEE

- A. Upon final acceptance of the project as being properly installed, the Contractor shall guarantee the plant materials as follows:
 - 1. All shrubs and groundcovers shall be guaranteed by the Contractor as to growth and health for a period of sixty (60) days after completion of the maintenance period and final acceptance.
 - 2. All trees shall be guaranteed by the contractor to thrive and grow in an acceptable upright position for a period of one (1) year after completion of the maintenance period and final acceptance.
- B. The Contractor shall, within fifteen (15) days after receiving written notification by the Landscape Architect or Owner's Representative, remove and replace all guaranteed plant materials which die or become unhealthy or appear to be in a badly impaired condition at any time during the guarantee period. Any plants that settle below or rise above the desired finished grade shall also be reset to the proper grade.
- C. All replacements shall be plants of the same kind, size, and quality as originally specified in the "plant list" and they shall be furnished, planted, staked, and maintained as specified herein at no additional cost.
- D. The Contractor will not be responsible for plants destroyed or lost due to occupancy of the project, vandalism on the part of others, or improper maintenance or lack thereof.
- E. At the conclusion of the guarantee period and prior to final inspection of the plant materials by the Landscape Architect or Owner's Representative, the Contractor shall remove all tree stakes. This period of time shall be approximately 1 year after initial planting.
 - 1. Stakes shall be removed by first cutting the ties securing the tree to stakes and secondly pulling stakes or guys out of the ground.
 - 2. Stakes shall not be broken off above, at, or below ground levels but removed completely.
- F. At the conclusion of the guarantee period a final inspection of all planting included in this contract shall be made by the Landscape Architect or Owner's Representative. At that time any plant found to be unhealthy, broken, damaged, or otherwise in an impaired condition shall be noted. Plants so noted shall be removed immediately from the site by the Contractor and replaced by him, as specified under this section, with plants of like kind and size in the manner previously specified for the original planting without extra compensation.

END OF SECTION

SECTION 03100
CONCRETE FORMS AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Design Requirements
 - 2. Submittals
 - 3. Quality Assurance
 - 4. Qualifications
 - 5. Delivery, Storage, and Handling
 - 6. Coordination
- B. Related Sections:
 - 1. Division 2
 - 2. Division 3
 - 3. Division 5

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials
 - 2. ACI 301 - Specifications for Structural Concrete
 - 3. ACI 318 - Building Code Requirements for Structural Concrete
 - 4. ACI 347 - Guide to Formwork for Concrete
- B. American Forest and Paper Association:
 - 1. AF&PA - National Design Specifications for Wood Construction
- C. The Engineered Wood Association:

1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood
- D. ASTM International:
1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
 2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
- E. West Coast Lumber Inspection Bureau:
1. WCLIB - Standard Grading Rules for West Coast Lumber

1.3 DESIGN REQUIREMENTS

- A. Design, Engineer and construct formwork, shoring and bracing in accordance with ACI 318 to conform to design and applicable code requirements to achieve concrete shape, line and dimension as indicated on Drawings.
1. Engineered Design required for the following systems:
 - a. Elevated structural concrete slabs, beams and joists.
 - b. Walls greater than 8-foot in height.

1.4 SUBMITTALS

- A. Section 01300 – Submittals: Requirements for submittals.
- B. Shop Drawings: Signed and sealed by professional engineer.
1. Submit formwork, shoring, and re-shoring Shop Drawings.
 2. Indicate the following:
 - a. Pertinent dimensions, openings, methods of construction, types of connections, materials, joint arrangement and details, ties and shores, location of framing, studding and bracing, and temporary supports.
 - b. Means of leakage prevention for concrete exposed to view in finished construction.
 - c. Sequence and timing of erection and stripping assumed compressive strength at time of stripping, height of lift and height of drop during placement.

- d. Vertical, horizontal and special loads in accordance with ACI 347, Section 2.2 and camber diagrams, when applicable.
 - e. Notes to formwork erector showing size and location of conduits and piping embedded in concrete in accordance with ACI 318, Section 6.3.
 - f. Procedure and schedule for removal of shores and installation and removal of re-shores.
 - C. Product Data: Submit data on void form materials and installation requirements.
 - D. Design Data: Signed and sealed by professional engineer.
 - 1. Indicate design data for formwork and shoring.
 - 2. Indicate loads transferred to structure during process of concreting, shoring and re-shoring.
 - 3. Include structural calculations to support design.
- 1.5 QUALITY ASSURANCE
- A. Perform work in accordance with ACI 347.
 - B. For wood products furnished for work of this Section, comply with AF&PA.
- 1.6 QUALIFICATIONS
- A. Design formwork under direct supervision of Professional Engineer experienced in design of this work and licensed at Project location.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Division 1: Products storage and handling requirements.
 - B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.
- 1.8 COORDINATION
- A. Division 1: Coordination and project conditions.
 - B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

- A. Softwood Plywood: APA/EWA PS 1, C Plugged Grade, Group 3.
- B. Lumber Forms:
 - 1. Application: Use for edge forms and unexposed finish concrete.
 - 2. Boards: 6-inches or 8-inches in width, shiplapped or tongue and groove, "Standard" Grade Douglas Fir, conforming to WCLIB Standard Grading Rules for West Coast Lumber. Surface boards on four sides.
- C. Plywood Forms:
 - 1. Application: Use for exposed finish concrete.
 - 2. Forms: Conform to PS 1; full size 4-foot x 8-foot panels; each panel labeled with grade trademark of APA/EWA.
 - 3. Plywood for Surfaces to Receive Membrane Waterproofing: Minimum of 5/8-inch thick; APA/EWA "B-B Plyform Structural I Exterior" grade.
 - 4. Plywood where "Smooth Finish" is required, as indicated on Drawings: APA/EWA "HD Overlay Plyform Structural I Exterior" grade, minimum of 3/4-inch thick.

2.2 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
- C. Tubular Column Type: Round, spirally wound laminated fiber material; surface treated with release agent, non-reusable, sizes.
- D. Steel Forms: Sheet steel, suitably reinforced, and designed for particular use indicated on Drawings.
- E. Form Liners: Smooth, durable, grainless and non-staining hardboard, unless otherwise indicated on Drawings.
- F. Framing, Studding and Bracing: Stud or No. 3 structural light framing grade.

2.3 FORMS FOR CURVED WALLS

- A. All curved walls as indicated on the project Drawings shall be formed with curved, prefabricated forms constructed to match the radial lines, interior and exterior, of the walls as indicated on the plans.

2.4 FORMWORK ACCESSORIES

- A. Form Ties: Snap-off type, galvanized metal, fixed or adjustable length, cone type, with waterproofing washer, one inch back break dimension, free of defects capable of leaving holes larger than one inch in concrete surface.
- B. Spreaders: Standard, non-corrosive metal form clamp assembly, of type acting as spreaders and leaving no metal within one inch of concrete face. Wire ties, wood spreaders or through bolts are not permitted.
- C. Form Anchors and Hangers:
 - 1. Do not use anchors and hangers exposed concrete leaving exposed metal at concrete surface.
 - 2. Symmetrically arrange hangers supporting forms from structural steel members to minimize twisting or rotation of member.
 - 3. Penetration of structural steel members is not permitted.
- D. Form Release Agent: Colorless mineral oil that will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- E. Corners: Fillet or Chamfer with rigid plastic or wood strip, dimensions as indicated on the Drawings; maximum possible lengths.
- F. Bituminous Joint Filler: ASTM D1751.
- G. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.

2.5 COATINGS

- A. Coatings for Aluminum: Polyamide epoxy finish coat with paint manufacturer's recommended primer for aluminum substrate. Apply one coat primer and one coat finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Division 1: Coordination and project conditions.
- B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
- C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Engineer.

3.2 INSTALLATION

- A. Earth Forms:
 - 1. Earth forms are not permitted, except for concrete encasement of pipes and conduits and as specifically indicated on the Drawings.
- B. Formwork - General:
 - 1. Provide top form for sloped surfaces steeper than one and a half horizontal to one vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
 - 2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
 - 3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
 - 4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
 - 5. Complete wedging and bracing before placing concrete.
- C. Forms for Smooth Finish Concrete:
 - 1. Use steel, plywood or lined board forms.
 - 2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
 - 3. Install form lining with close-fitting square joints between separate sheets without springing into place.
 - 4. Use full size sheets of form lines and plywood wherever possible.
 - 5. Tape joints to prevent protrusions in concrete.

6. Use care in forming and stripping wood forms to protect corners and edges.
 7. Level and continue horizontal joints.
 8. Keep wood forms wet until stripped.
- D. Forms for Surfaces to Receive Membrane Waterproofing: Use plywood or steel forms. After erection of forms, tape form joints to prevent protrusions in concrete.
- E. Framing, Studding and Bracing:
1. Space studs at 16-inch center maximum for boards and 12-inch on center maximum for plywood.
 2. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.
 3. Construct beam soffits of material minimum of 2-inch thick.
 4. Distribute bracing loads over base area on which bracing is erected.
 5. When placed on ground, protect against undermining, settlement or accidental impact.
- F. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- G. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- H. Obtain Engineer's approval before framing openings in structural members not indicated on Drawings.
- I. Install fillet and chamfer strips on external corners of beams, joists, columns and other members as indicated on the Drawings.
- J. Install void forms in accordance with manufacturer's recommendations.

3.3 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

- D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Install formed openings for items to be embedded in or passing through concrete work.
- B. Locate and set in place items required to be cast directly into concrete.
- C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- D. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install water stops continuous without displacing reinforcement. Heat seal joints watertight.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- H. Form Ties:
 - 1. Use sufficient strength and sufficient quantity to prevent spreading of forms.
 - 2. Place ties at least one inch away from finished surface of concrete.
 - 3. Leave inner rods in concrete when forms are stripped.
 - 4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.
- I. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- J. Construction Joints:
 - 1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.

2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
 3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
 4. Arrange joints in continuous line straight, true and sharp.
- K. Embedded Items:
1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
 2. Do not embed wood or uncoated aluminum in concrete.
 3. Obtain installation and setting information for embedded items furnished under other Specification sections.
 4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
 5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.
- L. Openings for Items Passing Through Concrete:
1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
 2. Coordinate work to avoid cutting and patching of concrete after placement.
 3. Perform cutting and repairing of concrete required as result of failure to provide required openings.
- M. Screeds:
1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
 2. Slope slabs to drain where required or as shown on Drawings.
 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.

N. Screed Supports:

1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane.
2. Staking through membrane is not permitted.

O. Cleanouts and Access Panels:

1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

3.5 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.6 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Engineer.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Removal of forms shall be as indicated in the Drawings. Contractor shall provide sampling and testing for compressive strength as necessary to justify the time for form removal. Such sampling and testing shall occur separate from Owner-provided special inspections and the cost shall be borne by Contractor. Submit test reports to Engineer.

3.7 ERECTION TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.
- B. Camber slabs and beams 1/8-inch per 10 feet in accordance with ACI 301.

3.8 FIELD QUALITY CONTROL

- A. Section 01400 – Quality Assurance and Quality Control: Field inspecting, testing, adjusting, and balancing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- C. Notify Engineer after placement of reinforcing steel in forms, but prior to placing concrete.
- D. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

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SECTION 03100 - 12

**CONCRETE FORMS
AND ACCESORIES**

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete and reinforced unit masonry.

1.2 RELATED SECTIONS

- A. Division 1
- B. Division 3

1.3 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings
- B. ACI 315 – Manual of Standard Practices for Detailing Concrete Structures
- C. ACI 318 - Building Code Requirements for Reinforced Concrete
- D. ACI 350 - Environmental Engineering Concrete Structures
- E. ACI SP-66 - American Concrete Institute - Detailing Manual
- F. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement
- G. ANSI/ASTM A184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
- H. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement
- I. ANSI/ASTM A496 - Deformed Steel Wire Fabric for Concrete Reinforcement
- J. ANSI/ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement
- K. ANSI/AWS D1.4 - Structural Welding Code for Reinforcing Steel
- L. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement
- M. ASTM A704 - Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
- N. ASTM A706 - Low-Alloy Steel Deformed Bars for Concrete Reinforcement

- O. AWS D12.1 - Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction
- P. CRSI - Concrete Reinforcing Steel Institute - Manual of Practice
- Q. CRSI 63 - Recommended Practice for Placing Reinforcing Bars
- R. CRSI 65 - Recommended Practice for Placing Bar Supports, Specifications and Nomenclature

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings:
 - 1. Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric bending and cutting schedules, and supporting and spacing devices, if dissimilar from Drawings.
 - 2. Indicate dimensions, materials, bracings, and arrangement of joints and ties.
- C. Submit plan for placement of all concrete walls four weeks prior to placement.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Indicate locations of all construction joints prior to concrete placement.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301, ACI 315, ACI 318, and ACI 350.
- B. Maintain one copy of each document on site.
- C. Submit certified copies of mill test report of reinforcement materials analysis.

1.6 COORDINATION

- A. Coordinate work under provisions of Section 01039.
- B. Coordinate with placement of formwork, formed openings and other work.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars (#3 bars may

be grade 40 ksi), unfinished, free of dirt, oil, grease, loose scale or other substances that might reduce development of the bond strength.

- B. Reinforcing Steel Mat: ASTM A704, ASTM A615, 60 ksi yield grade; steel bars or rods, unfinished.
- C. Stirrup Steel: ANSI/ASTM A82, unfinished.
- D. Welded Steel Wire Fabric: ASTM A185 Plain Type, or ASTM A496 Welded Deformed Type; in coiled rolls.
- E. Mechanical Rebar Splicing Devices: Where indicated on the Drawings, provide mechanical threaded dowel rebar splicing devices of the size type, spacing and placement indicated. The system shall be a standard two-piece threaded coupler system, with the first piece consisting of a dowel with integral female-threaded head which will accept the second (future or second phase placement) male threaded dowel section. The first piece shall have an integral flat surfaced, flush mounted flange allowing for attachment to the pour stop forming in such a manner as to securely hold the device in place.
 - 1. Mechanical splices shall meet the Acceptance Criteria of ICC Evaluation Services report AC133.
 - 2. Mechanical Splice shall conform to Type 1 requirements and develop 100 percent of the specified ultimate strength of the bar being spliced.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16-gauge annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.

2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI 318 and ACI 350.
- B. Locate reinforcing splices not indicated on Drawings, at point of minimum stress.

2.4 EMBEDMENT ANCHORS

- A. Simpson SET high-strength epoxy system or Hilti, HVA epoxy embedment anchors. Refer to notes or specifications for Concrete Doweling or Field-set dowels and anchors.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier/retarder.
- C. Accommodate placement of formed openings.
- D. Conform to ACI 350 for concrete cover over reinforcement.
- E. Splice all bars with a minimum lap of 32 bar diameters unless otherwise noted on the Drawings.
- F. Reinforcement steel shall have the concrete cover noted on the Drawings.
- G. Metal clips or supports holding the reinforcement shall not be placed in contact with the forms or the subgrade.
- H. Secure and support reinforcement and dowels in position with wire or other approved methods. Shoving reinforcement or dowels into freshly poured concrete is prohibited.

3.2 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01400.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cast-in-place concrete slabs-on-grade, structural floors, beams, joists, decks, foundations, walls, piers, pilasters and columns
- B. Control and contraction joint devices including joint sealant
- C. Equipment pads and thrust blocks
- D. Concrete grout and bonding adhesives
- E. Lean concrete mix (Controlled density fill)

1.2 RELATED SECTIONS

- A. Division 1
- B. Division 2
- C. Division 3

1.3 REFERENCES

- A. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
- B. ACI 301 - Structural Concrete for Buildings
- C. ACI 302 - Guide for Concrete Floor and Slab Construction
- D. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
- E. ACI 305R - Hot Weather Concreting
- F. ACI 306R - Cold Weather Concreting
- G. ACI 308 - Standard Practice for Curing Concrete
- H. ACI 318 – Building Code Requirements for Reinforced Concrete
- I. ACI 350R – Environmental Engineering Concrete Structures

- J. ANSI/ASTM D994 - Preformed Expansion Joint Filler for Concrete (Bituminous Type)
- K. ANSI/ASTM D1190 - Concrete Joint Sealer, Hot-Poured Elastic Type
- L. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
- M. ANSI/ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
- N. ASTM C31 - Making and curing concrete test specimens in the field
- O. ASTM C33 - Concrete Aggregates
- P. ASTM C39 - Compressive strength of cylindrical concrete specimens
- Q. ASTM C94 - Ready-Mixed Concrete
- R. ASTM C150 - Portland Cement
- S. ASTM C260 - Air Entraining Admixtures for Concrete
- T. ASTM C494 - Chemicals Admixtures for Concrete
- U. ASTM C618 - Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

1.4 SUBMITTAL

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on joint devices, attachment accessories, admixtures and aggregate and cement.
- C. Samples: Submit two-inch long samples of contraction joint and control joint.
- D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent work.
- E. Submit mix design and certification of compliance for all admixtures and curing compounds.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.
- B. Accurately record actual locations of embedded utilities and components which are concealed from view.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Maintain one copy of each document on site.
- C. Acquire cement and aggregate from same source for all work.
- D. Conform to ACI 305R when concreting during hot weather.
- E. Conform to ACI 306R when concreting during cold weather.

1.7 FIELD SAMPLES

- A. Provide under provisions of Section 01400.

1.8 COORDINATION

- A. Coordinate work under provisions of Section 01039.
- B. Coordinate the placement of joint devices with erection of concrete form work and placement of form accessories.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I or II.
- B. Fine and Coarse Aggregates: $\frac{3}{4}$ -inch maximum aggregate per ASTM C33.
- C. Water: Clean and not detrimental to concrete.

2.2 ADMIXTURES

- A. Air Entrainment: ASTM C260; manufactured by Grace Daravair 'M' or SIKA Chemical 'AER'.

2.3 ACCESSORIES

- A. Bonding Agent: Two component modified epoxy resin.
- B. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.
- C. Epoxy/Grout Adhesive:
 - 1. Three Component Epoxy Resin System:

- Two liquid epoxy components.
 - One inert aggregate filtered component.
 - Each component furnished in separate package for mixing at job site.
2. Apply only to clean, dry, sound surface.
 3. Mix and place in accordance with manufacturer's instructions.
 4. Completely fill all cavities and spaces around dowels and anchors without voids.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler Type A: ASTM D1751; Asphalt impregnated fiberboard or felt, ½-inch thick; tongue and groove profile.
- B. Joint Filler Type B: ASTM D1752; Closed cell polyvinyl chloride foam, resiliency recovery of 95 percent if not compressed more than 50 percent of original thickness.
- C. Construction Joint Devices: Integral extruded plastic; 3/8-inch thick, formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge.
- D. Contraction Joint Devices: ASTM B221 resilient elastomeric or neoprene filler strip with a Shore A hardness of 35 to permit plus or minus 25 percent joint movement with full recovery; of longest manufactured length at each location, flush mounted.
- E. Sealant: Elastomeric sealant conforming to ASTM C920 and Federal Specification TT-S-00277E. In all joints for liquid-retaining structures provide sealants specially formulated to conform to Use Requirement I, for submerged conditions.
- F. Moisture-activated Strip Waterstop: Continuous water-activated strip joint water-stop noted on the Drawings as "Swell-seal" or "Swellstop" water-stop shall be a flexible butyl rubber and swellable clay waterproofing compound in the dimensions called for on the Drawings. Provide "Swellstop" by Greenstreak, Inc. or an approved equal.
- G. Flexible Waterstops: Polyvinyl chloride (PVC), minimum 2,000 psi tensile strength with a minimum working temperature range of plus 35° F to plus 175° F. Conform to ASTM D570, D746, D1149 and CRD-C572. Provide profile, type and width as indicated on the Drawings in maximum possible lengths with pre-formed corner, joint and intersection pieces fully heat-welded or glued together as approved by the manufacturer in order to form a water-tight system.

2.5 CONCRETE MIX

- A. Mix and deliver concrete in accordance with ASTM C94, Alternative Number 1.

- B. Provide concrete mix designs as noted under "Project Concrete Mix Types" in the Structural Materials Section of the General Structural Notes and Specifications included on the Structural Project Drawings.
- C. Use accelerating admixtures in cold weather only when approved by Engineer. Use of admixtures will not relax cold weather placement requirements.
- D. Do not use calcium chloride.
- E. Use set retarding admixtures during hot weather only when approved by Engineer.
- F. A water-reducing admixture conforming to ASTM C494 used in strict conformance with the manufacturer's specifications shall be incorporated in all concrete mix designs. For all water-retaining structures, a high-range water-reducing admixture conforming to ASTM C494 Type F or G, shall be used. Total slumps shall not exceed 10 inches and the water-cement ratios listed is not exceeded. W/C ratio listed refers to the total cement plus fly ash content.

2.6 CONCRETE BONDING ADHESIVE

- A. Concrese liquid bonding adhesive (LPL) two-component, liquid epoxy bonding agent.
- B. No substitutes.

2.7 FLEXIBLE WATERSTOP

- A. Waterstop noted as flexible or PVC on the Drawings shall be compounded from polyvinyl chloride (PVC) and shall have the following properties:

1. Minimum Ultimate Elongation	250 Percent
2. Minimum Tensile Strength	2,000 psi
3. Brittle Temperature	-23 degrees F
4. Shore Durometer Type "A" Hardness	80, approximately
5. Specific Gravity	1.3, approximately
- B. Waterstop shall be uniform in dimensions, homogeneous and free from porosity. Minimum thickness shall be ¼-inch and minimum width of six (6) inches unless otherwise shown on the Drawings. Waterstop shall be ribbed center bulb type.
- C. Corrugated type waterstops are not acceptable.

2.8 CONTROLLED LOW STRENGTH MATERIAL or CONTROLLED DENSITY FILL (CDF)

- A. Provide CDF where specified on the drawings and to replace fill or backfill where the

specified compaction can't be achieved due to geometry restrictions or as directed by the Engineer.

B. Lean concrete mix for CDF shall meet the following design criteria:

1. Mix type M-CDF as follows: A mixture of cement, fine sand, coarse aggregate, fly ash and admixtures formulated to be flowable and self-consolidating with a net 28-day compressive strength of 200 to 300 psi.

2.9 MISCELLANEOUS SITE CONCRETE

A. Miscellaneous site concrete such as concrete thrust blocks, guard post bases and fence post bases shall meet the requirements of Mix M2500-SEC as noted in General Structural Notes and Specifications unless specifically noted otherwise on the Contract Drawings.

2.10 MISCELLANEOUS CONCRETE PADS

A. Miscellaneous concrete pads such as valley gutter, exterior pads at doorways, valve box collars, etc. shall meet the requirement of Concrete Mix M4000-STD as noted in the General Structural Notes and Specifications unless specifically noted otherwise on the Contract Drawings.

2.11 FOUNDATIONS AND STRUCTURAL CONCRETE

A. As noted in the General Structural Notes and Specifications, as shown on the Drawings.

1. M3500-INT for interior concrete floor slabs-on-grade.
2. M4000-STD for concrete footings, walls, piers, pilasters, elevated slabs, beams and columns; interior or exterior use.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Section 01010.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 318 and ACI 350.
- B. Notify Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, water-stops, formed expansion and contraction joints, and are not disturbed during concrete placement.
- D. Install joint fillers, primers and sealant in accordance with the manufacturer's instructions.
- E. Separate slabs on grade from vertical surfaces with ½-inch thick joint filler.
- F. Extend joint filler from bottom of slab to within 1/4 inch of finished slab surface.
- G. Install joint devices in accordance with manufacturer's instructions.
- H. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.
- I. Install joint covers in one piece, longest practical length, when adjacent construction activity is complete.
- J. Apply sealants in joint devices in accordance with manufacturer's recommendations.
- K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- L. Place concrete continuously between predetermined control and construction joints.
- M. Do not interrupt successive placement; do not permit cold joints to occur.

3.4 CONCRETE FINISHING

- A. Provide formed and un-formed concrete surfaces with finishes as Scheduled.
- B. Finish concrete slab surfaces in accordance with ACI 302, and Section 03346 – Concrete Floor Finishing.
- C. In areas required to drain pitch surface uniformly to drain as indicated on Drawings.
- D. Finish concrete walls and other surfaces per the following Schedule:

Structure Type	Initial Surface Finish Type	Final Surface Finish Type
Footings	SF-1.0	None
Conc. Piers & Foundation walls, exposed to View	SF-3.0	None
Conc. Piers & Foundation walls, below grade	SF-1.0	None
Interior concrete walls	SF-2.0	None

- E. Where not otherwise noted, provide Grout Cleaned and Rubbed Surface Finish in all areas unless the area is identified for Coatings. In areas identified for coatings, provide Surface Finish noted, and Coatings per Technical Specifications Division 9 and the Architectural Finish Schedule.
- F. All concrete surfaces shall receive a Surface Finish; where question arise as to finish type, contact the Project Engineer for clarification.

3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for the period necessary for hydration of cement and hardening of concrete. Unless otherwise approved, concrete shall be maintained above 50 degrees F and in a moist condition for a minimum of seven days after placement.
- C. Cure concrete surfaces in accordance with ACI 308.

3.6 FIELD QUALITY CONTROL

- A. Field review and testing will be performed in accordance with ACI 301 and under provisions of Section 01400.
- B. All concrete repair or restoration shall comply with the provisions of Section 03930-Concrete Rehabilitation.
- C. Provide free access to work and cooperate with appointed firm.
- D. Submit proposed mix design of each class of concrete to Engineer and testing firm for review prior to commencement of work.
- E. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
- F. One additional test cylinder may be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.

3.7 PATCHING

- A. Allow Engineer to review concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- C. Patch imperfections as directed by the Engineer and in accordance with ACI 301.
- D. Patch cone holes at form ties to match adjacent concrete.

3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. During the progress of the work, if the laboratory-cured values shown for each concrete design strength and quality as determined by compression cylinders fail to attain the requirements specified, suspend all concrete work. Concrete that has been placed in the work and does not meet the specified requirements will be reviewed by the Engineer and the Contractor. Any field testing such as core drilling required to verify in-place concrete strengths after compression tests fail to meet requirements shall be at the Contractor's expense. The Contractor shall, at his own expense, correct or remove the defective work in a manner approved by the Engineer.
- C. The following criteria shall be followed in defining cracks by minimum measured crack width; using feeler gauges or other approved means:
 - 1. Cracks with maximum widths less than 0.015 inches (1/64-inch) shall be considered hair-line cracks and shall be repaired or sealed as directed by the Project Engineer.
 - 2. Cracks equal to or greater than 0.015 inches (1/64-inch) and less than or equal to .095 inches (3/32-inch) in width at any point shall be considered medium cracks with mandatory repair by injection required.
 - 3. Any cracks equal to or greater than 0.095 inches (3/32-inch) in width at any point shall be considered large cracks with mandatory repair by injection or as directed by the Project Engineer.
- D. Repair or replacement of defective concrete will be determined by the Engineer.
- E. Repair defects in formed concrete surfaces within 24 hours of removing forms.
- F. Replace defective concrete within 48 hours.
- G. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

- H. Cut out and remove defective area.
- I. Cut edges square to avoid feathering.
- J. Comply with ACI 301, Chapter 9.
- K. Perform repair work so as not to interfere with curing of adjacent concrete.
- L. Adequately cure repair work.

END OF SECTION

**SECTION 03346
CONCRETE FLOOR FINISHING**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Floor finishing
- B. Floor surface treatment

1.2 RELATED SECTIONS

- A. Division 3

1.3 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings
- B. ACI 302 – Concrete Floor and Slab Construction

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Liquid Sealer:
 - 1. Sonneborn Building Products, Product Kure-N-Seal
 - 2. Dayton Superior, Product Safe Cure & Seal
 - 3. ChemMasters, Product Cure & Seal
- B. Surface Densifier & Hardener:
 - 1. CONSOLIDECK by Prosoco
 - 2. ECO-HARD-N-SEAL by Tennant Coatings
 - 3. LIQUI-HARD by W. R. Meadows

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that the floor surfaces are acceptable to receive the work of this section.

3.2 FLOOR FINISHING

- A. Finish concrete floor surfaces in accordance with ACI 301 and 302.
- B. Interior floor surfaces:
 - 1. Steel trowel surfaces which are scheduled to be exposed.
 - 2. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains. All floors must slope to drain. No standing water on finished concrete floors is allowed.
- C. Exterior floor Surfaces:
 - 1. Apply a light broom finish to finished floor surfaces. Provide for all exterior walks, stairs, or exterior slab on grade unless otherwise specified. Slope surface away from building, maintain a uniform slope of 1% minimum.

3.3 FLOOR SURFACE TREATMENT

- A. Interior Floor Surfaces:
 - 1. Apply a Liquid Surface Densifier & Hardener in accordance with the Manufacturer's instructions on all floor surfaces not otherwise covered.
- B. Exterior Floor Surfaces:
 - 1. Apply a Liquid Surface sealer in accordance with the Manufacturer's instructions on all floor surfaces not otherwise specified.

3.4 TOLERANCES

- A. Maximum variation of surface flatness for exposed concrete floors: 1/8 inch (3 mm) in 10 feet (3 meters).

END OF SECTION

**SECTION 03390
CONCRETE CURING**

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes initial and final curing of all horizontal and vertical concrete surfaces. All concrete placed on the job shall be cured in accordance with this section in-order to assure that it will attain required strength, toughness and durability.
- B. Initial Curing Stage. All concrete surfaces exposed to the environment shall be protected and cured until the concrete has attained 90% of its specified compressive strength or for 7 days minimum.
- C. Related Sections:
 - 1. Division 3

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete
 - 2. ACI 302.1 - Guide for Concrete Floor and Slab Construction
 - 3. ACI 308.1 - Standard Specification for Curing Concrete
 - 4. ACI 318 - Building Code Requirements for Structural Concrete
 - 5. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures
- B. ASTM International:
 - 1. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete
 - 2. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - 3. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
 - 4. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting

1.3 SUBMITTALS

- A. Section 01300 – Submittals: Submittal procedures.
- B. Product Data: Submit data on curing compounds, mats, film, compatibilities, and limitations.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 308.
- B. Maintain one copy of each document on site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Division 1: Product storage and handling requirements.
- B. Deliver curing materials in manufacturer's packaging including application instructions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Membrane Curing Compound: ASTM C1315 Type I, Class A.
- B. Absorptive Mats Type C: ASTM C171, cotton fabric, burlap-polyethylene, minimum eight ounces/square yard bonded to prevent separation during handling and placing.
- C. Polyethylene Film Type E: ASTM C171, 6 mil thick clear, white or black. Color use may depend on daily ambient temperatures per ACI 308.1 requirements.
- D. Water: Potable, not detrimental to concrete.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Division 1: Coordination and project conditions.
- B. Verify substrate surfaces are ready to be cured.

3.2 INSTALLATION - HORIZONTAL SURFACES

- A. Cure concrete in accordance with ACI 308.1 with one of the following methods.
- B. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for five days minimum.

- C. Fog Spraying: Spray water using fog-spray equipment over floor slab areas and maintain wet for the initial curing stage. Direct discharge of the atomized water spray onto the surface of the concrete is unacceptable.
- D. Absorptive Mat: Spread cotton fabric over floor slab areas. Spray with water until mats are saturated and maintain in saturated condition for the initial curing stage.
- E. Membrane Curing Compound: Apply curing compound in two coats with second coat applied at right angles to first.
- F. The top surfaces of concrete walls that will be exposed to view shall be cured as specified herein.

3.3 INSTALLATION - VERTICAL SURFACES

- A. Cure concrete in accordance with ACI 308.1 with one of the following methods.
- B. Concrete that retains its formwork protection does not require additional curing procedures. Once the formwork is stripped, additional curing procedures are required until the concrete reaches its initial curing stage.
- C. Fog Spraying: Spray water using fog-spray equipment over floor slab areas and maintain wet for seven days minimum. Direct discharge of the atomized water spray onto the surface of the concrete is unacceptable.
- D. Membrane Curing Compound: Apply compound in two coats with second coat applied at right angles to first.

3.4 SURFACES INSIDE FORMWORK

- A. Concrete surfaces protected by formwork require no special curing treatment as long as the formwork remains in place a minimum of seven days or until the concrete has reached the specified strength.
- B. If forms are removed prior to seven days or the concrete attaining the specified strength, then all surfaces shall be cured as specified elsewhere in this section for the remainder of the required curing period.
- C. Top or other exposed portions of walls and other concrete elements covered with protecting formwork require curing as specified elsewhere in this section.
- D. In hot weather wall forms shall be hosed down with water and covered with protective polyethylene Film to prevent excessive moisture loss.

3.5 PROTECTION OF FINISHED WORK

- A. Section 01700 – Contract Closeout: Protecting finished work.
- B. Do not permit traffic over unprotected floor surface.

END OF SECTION

**SECTION 03600
NON-SHRINK GROUT**

PART 1 GENERAL

- 1.1 Provide Non-Shrink Grout where specified on the Drawings including underneath pumps, bearing plates and equipment and as directed by the Engineer.

1.2 REFERENCES

- A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):
 - a. C230, Standard Specification for Flow Table for Use in Tests of Hydraulic Cement.
 - b. C1107, Standard Specification for Packaged Dry, Hydraulic- Cement Grout (Non-shrink).
2. Corps of Engineers (COE):
 - a. CRD-C611, Flow of Grout for Preplaced Aggregate Concrete.
 - b. CRD-C621, Specification for Non-shrink Grout

1.3 SUBMITTALS

- A. Shop Drawings:

1. Product data of grouts.
2. Proposed method for keeping existing concrete surfaces wet prior to placing grout.
3. Forming method for fluid grout placements.
4. Curing method for grout.

- B. Information Submittals:

1. Manufacturer's Written Instructions:
 - a. Adding fiber reinforcing to batching.
 - b. Cement-water ratio of grout topping.
 - c. Mixing of grout.
2. Manufacturer's proposed training schedule for grout work.

3. Manufacturer's Certificate of Compliance:
 - a. Grout free from chlorides and other corrosion-causing chemicals.
 - b. Non-shrink grout properties of Categories II and III, verifying expansion at three or 14 days will not exceed the 28-day expansion and non-shrink properties are not based on gas or gypsum expansion.
4. Manufacturer's Certificate of Proper Installation.
5. Statements of Qualification: Non-shrink grout manufacturer's representative.
6. Test Reports:
 - a. Test report for 24-hour evaluation of non-shrink grout.
 - b. Test results and service report from demonstration and training session.
 - c. Field test reports and laboratory test results for field-drawn Samples.

1.4 QUALIFICATIONS

- A. Non-shrink Grout Manufacturer's Representative: Authorized and trained representative of grout manufacturer. Minimum of one year of experience that has resulted in successful installation of grouts similar to those for this Project.
- B. For grout suppliers not listed herein, provide completed 24-hour Evaluation of Non-shrink Grout Test Form, attached at the end of this section. Independent testing laboratory to certify that testing was conducted within last 18 months.

1.5 GUARANTEE

- A. Manufacturer's guarantee shall not contain disclaimer on the product data sheet, grout bag, or container limiting responsibility to only the purchase price of products and materials furnished.
- B. Manufacturer guarantees participation with Contractor in replacing or repairing grout found defective due to faulty materials, as determined by industry standard test methods.

PART 2 PRODUCTS

2.1 NONSHRINK GROUT

- A. Category I:
 1. Nonmetallic and non-gas-liberating.
 2. Prepackaged natural aggregate grout requiring only the addition of water.

3. Test in accordance with ASTM C1107:
 - a. Flow-able consistency 140 percent, five drops in 30 seconds, in accordance with ASTM C230.
 - b. Flow-able for 15 minutes.
 4. Grout shall not bleed at maximum allowed water.
 5. Minimum strength of flow-able grout, 3,000 psi at three days, 5,000 psi at seven days, and 7,000 psi at 28 days.
 6. Manufacturers and Products:
 - a. Chemrex, Inc., Shakopee, MN; Set Grout.
 - b. Euclid Chemical Co., Cleveland, OH; NS Grout.
 - c. Dayton Superior Corp., Miamisburg, OH; 1107 Advantage Grout.
 - d. US MIX Products, Denver, CO; US Spec Multi-Purpose Grout.
 - e. L & M Construction Chemicals, Inc., Omaha, NE; Duragrout.
- B. Category II:
1. Nonmetallic, non-gas-liberating.
 2. Prepackaged natural aggregate grout requiring only the addition of water.
 3. Aggregate shall show no segregation or settlement at fluid consistency at specified times or temperatures.
 4. Test in accordance with COE CRD-C621 and ASTM C1107, Grade B:
 - a. Fluid consistency 20 to 30 seconds in accordance with COE CRD-C611.
 - b. Temperatures of 40, 80, and 100 degrees F.
 5. One hour after mixing, pass fluid grout through flow cone with continuous flow.
 6. Minimum strength of fluid grout, 3,500 psi at one day, 4,500 psi at three days, and 7,500 psi at 28 days.
 7. Maintain fluid consistency when mixed in one to nine yard loads in ready-mix truck.
 8. Manufacturers and Products:
 - a. Chemrex, Inc., Shakopee, MN; Master Flow 928.
 - b. Five Star Products Inc., Fairfield, CT; Five Star 100.

- c. Euclid Chemical Co., Cleveland, OH; Hi Flow Grout.
 - d. Dayton Superior Corp., Miamisburg, OH; Sure Grip High Performance Grout.
 - e. L & M Construction Chemicals, Inc., Omaha, NE; Crystex.
- C. Category III:
 - 1. Metallic and non-gas-liberating.
 - 2. Prepackaged aggregate grout requiring only the addition of water.
 - 3. Aggregate shall show no segregation or settlement at fluid consistency at specified times or temperatures.
 - 4. Test in accordance with COE CRD-C621 and ASTM C1107, Grade A:
 - a. Fluid consistency 20 to 30 seconds in accordance with COE CRD-C611.
 - b. Temperatures of 40 and 100 degrees F.
 - 5. 1 hour after mixing, pass fluid grout through flow cone with continuous flow.
 - 6. Minimum strength of fluid grout, 4,000 psi at one day, 5,000 psi at three days, and 9,000 psi at 28 days.
 - 7. Maintain fluid consistency when mixed in one to nine yard loads in ready-mix truck.
 - 8. Manufacturer and Product:
 - a. Chemrex, Inc., Shakopee, MN; EMBECO 885.
 - b. L & M Construction Chemicals, Inc., Omaha, NE; Ferrogrout.

PART 3 EXECUTION

3.1 NON-SHRINK GROUT

- A. General: Mix, place, and cure non-shrink grout in accordance with grout manufacturer's representative's training instructions.
- B. Form edges and place underneath metal bearing plates in such a manner as to fully fill all voids between the bearing plate and the supporting concrete surface.
- C. Form Tie or Through-Bolt Holes: Provide non-shrink grout, Category I and II, fill space with dry pack dense grout hammered in with steel tool and hammer. Through-bolt holes, coordinate dry pack dense grout application with vinyl plug in Section 03100 – Concrete Forms and Accessories, and bonding agent in Section 03300 – Cast-in-Place Concrete.

D. Grouting Machinery Foundations:

1. Block out original concrete or finish off at distance shown below bottom of machinery base with grout. Prepare concrete surface by sandblasting, chipping, or by mechanical means to remove any soft material.
2. Set machinery in position and wedge to elevation with steel wedges, or use cast-in leveling bolts.
3. Form with watertight forms at least two inches higher than bottom of plate.
4. Fill space between bottom of machinery base and original concrete in accordance with manufacturer's representative's training instructions.

3.2 FIELD QUALITY CONTROL

A. Evaluation and Acceptance of Non-shrink Grout:

1. Provide a flow cone and cube molds with restraining plates onsite. Continue tests during Project as demonstrated by grout manufacturer's representative.
2. Perform flow cone and bleed tests, and make three 2-inch by 2-inch cubes for each 25 cubic feet of each type of non-shrink grout used. Use restraining caps for cube molds in accordance with COE CRD-C621.
3. For large grout applications make three additional cubes and one more flow cone test. Include bleed test for each additional 25 cubic feet of non-shrink grout placed.
4. Consistency: As specified in Article Non-shrink Grout. Grout with consistencies outside range requirements shall be rejected.
5. Segregation: As specified in Article Non-shrink Grout. Grout when aggregate separates shall be rejected.
6. Non-shrink grout cubes shall test equal to or greater than minimum strength specified.
7. Strength Test Failures: Non-shrink grout work failing strength tests shall be removed and replaced.
8. Perform bleeding test to demonstrate grout will not bleed.
9. Store cubes at 70 degrees F.
10. Independent testing laboratory shall prepare, store, cure, and test cubes in accordance with COE CRD-C621.

3.3 MANUFACTURER'S SERVICES

A. General:

1. Coordinate demonstrations, training sessions, and applicable site visits with grout manufacturer's representative.
2. Provide and conduct onsite, demonstration and training sessions for bleed tests, mixing, flow cone measurement, cube testing, application, and curing for each category and type of non-shrink grout.
3. Necessary equipment and materials shall be available for demonstration.

B. Training:

1. Training is required for all Type III grout installations.
2. Grout manufacturer's representative shall train Contractor to perform grout work.
3. Establish location at site and schedule time for grout manufacturer's demonstration and training session of proposed non-shrink grouts. Mix non-shrink grouts to required consistency, test, place, and cure on actual Project, e.g., baseplates and tie holes to provide actual on-the-job training.
4. Use minimum of five bags for each grout Category III. Mix grout to fluid consistency and conduct flow cone and two bleed tests, make a minimum of six cubes for testing of two cubes at one, three, and 28 days. Use remaining grout for final work.
5. Training shall include methods for curing grout.
6. Mix and demonstrate patching through-bolt holes and block-outs for gate guides, and similar items.
7. Transport test cubes to independent test laboratory and obtain test reports and submit to engineer.

END OF SECTION

**SECTION 03930
CONCRETE REHABILITATION**

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Damaged or defective concrete repair.
2. Damaged or defective concrete reinforcement repair.
3. Damaged or defective concrete surface repair.
4. Placed concrete defect repair.
5. Placed concrete crack repair.

B. Related Sections:

1. Division 1

1.2 REFERENCES

A. ASTM International:

1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
3. ASTM C33 - Standard Specification for Concrete Aggregates.
4. ASTM C109/C109M - Standard Test Method for Compressive strength of Hydraulic Cement Mortars (Using 2-in. or 50 mm Cube Specimens).
5. ASTM C150 - Standard Specification for Portland Cement.
6. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
7. ASTM C293 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading).
8. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.

9. ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
10. ASTM C1042 - Standard Test Method for Bond Strength of Latex Systems Used With Concrete By Slant Shear.
11. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
12. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
13. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1.3 SUBMITTALS

- A. Section 01300 – Submittals: Submittal procedures.
- B. Product Data: Submit product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.
- C. Manufacturer's Instructions: Submit mixing instructions.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01700 – Contract Closeout: Closeout procedures.
- B. Project Record Documents: Accurately record actual locations of structural repairs, type of repair, and products used.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with a minimum of three years, experience.
- B. Applicator: Company specializing in concrete repair with minimum three years of experience and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Division 1: Product storage and handling requirements.
- B. Comply with instructions for storage, shelf life limitations, and handling.

SECTION 03930 - 2 CONCRETE REHABILITATION

PART 2 PRODUCTS

2.1 EPOXY ADHESIVE INJECTION MATERIALS

A. Manufacturers:

1. The Euclid Chemical Company.
2. L & M Construction Chemicals Inc. Model.
3. Sika Corporation Model.
4. Substitutions: Division 1.

B. Epoxy Adhesive: Two-part epoxy adhesive containing 100percent solids, meeting the following minimum characteristics:

	Characteristic	Test Method	Results
1.	Bond Strength	ASTM C882	2,700 psi
2.	Tensile Strength	ASTM D638	6,600 psi
3.	Elongation	ASTM D638	Two percent at seven days 70 degrees F
4.	Flexural Strength	ASTM D790	8,000 psi
5.	Compressive Strength	ASTM D695	6,500 psi

2.2 EPOXY MORTAR MATERIALS

A. Manufacturers:

1. The Euclid Chemical Company.
2. L & M Construction Chemicals Inc. Model.
3. Sika Corporation Model.
4. Substitutions: Division 1.

B. Epoxy Mortar: Three-part epoxy binding resin and aggregate mortar mixture.

C. Epoxy Binding Resin: Two-part epoxy resin containing 100 percent solids, meeting the following minimum characteristics:

	Characteristic	Test Method	Results
1.	Bond Strength	ASTM C882	2,700 psi
2.	Tensile Strength	ASTM D638	6,600 psi

SECTION 03930 - 3 CONCRETE REHABILITATION

- | | | | |
|----|----------------------|-----------|---|
| 3. | Elongation | ASTM D638 | Two percent at seven days
70 degrees F |
| 4. | Flexural Strength | ASTM D790 | 8,000 psi |
| 5. | Compressive Strength | ASTM D695 | 6,500 psi |

D. Aggregate: Type recommended by mortar manufacturer.

2.3 CEMENTITIOUS MORTAR MATERIALS

A. Manufacturers:

1. The Euclid Chemical Company.
2. L & M Construction Chemicals Inc. Model.
3. Sika Corporation Model.
4. Substitutions: Division 1

B. Cementitious Mortar: Packaged latex modified, silica fume enhanced, or portland cement patching mortar with the following properties:

1. Compressive Strength: ASTM C109/C109M; minimum 2,000 psi after one day and 5,000 psi after 28 days.
2. Bond Strength: ASTM C882 or ASTM C1042; minimum 2,500 psi after 28 days.
3. Flexural Strength; ASTM C293; minimum 1,500 psi after 28 days.

C. Bonding Agent: Polyvinyl acetate emulsion, dispersed in water while mixing, non-coagulant in mix, water resistant when cured.

D. Cleaning Agent: Commercial muriatic acid.

2.4 MIXING EPOXY MORTAR

A. Mix epoxy mortars to consistency for purpose intended.

B. Mix components in clean equipment or containers. Conform to pot life and workability limits.

2.5 MIXING CEMENTITIOUS MORTAR

A. Mix cementitious mortar to consistency required for purpose intended.

B. Include bonding agent as additive to mix.

SECTION 03930 - 4 CONCRETE REHABILITATION

PART 3 EXECUTION

3.1 EXAMINATION

- A. Division 1: Coordination and project conditions.
- B. Verify surfaces are ready to receive work.
- C. Beginning of installation means acceptance of substrate.

3.2 PREPARATION

- A. Clean concrete surfaces of dirt, laitance, corrosion, or other contamination; wire brush using acid; rinse surface and allow to dry.
- B. Flush out cracks and voids with chemical solvent or muriatic acid to remove laitance and dirt. Chemically neutralize by rinsing with water.
- C. Provide temporary entry ports spaced to accomplish movement of fluids between ports; no deeper than depth of crack to be filled or port size diameter no greater than thickness of crack. Provide temporary seal at concrete surface to prevent leakage of adhesive.
- D. For areas patched with epoxy mortar, remove broken and soft concrete **1/4 inch** deep. Remove corrosion from steel. Clean surfaces mechanically; wash with acid; rinse with water.
- E. Sandblast clean exposed reinforcement steel surfaces.

3.3 REPAIR WORK

- A. Repair exposed structural, shrinkage, and settlement cracks of concrete by epoxy injection, epoxy application, bonding agent and cementitious paste method as appropriate or as directed by the Project Engineer.
- B. Repair spalling. Fill voids flush with surface. Apply surface finish.

3.4 INJECTION - EPOXY RESIN

- A. Inject epoxy resin adhesive into prepared ports under pressure using equipment appropriate for particular application.
- B. Begin injection at lower entry port and continue until adhesive appears in adjacent entry port. Continue from port to port until entire crack is filled.
- C. Remove temporary seal and excess adhesive.
- D. Clean surfaces adjacent to repair and blend finish.

SECTION 03930 - 5 CONCRETE REHABILITATION

3.5 APPLICATION - EPOXY MORTAR

- A. Trowel apply mortar mix to average thickness as recommended by the product manufacturer. Tamp into place filling voids at spalled or voided areas.
- B. For patching honeycomb, trowel mortar onto surface, work mortar into honeycomb to bring surface flush with surrounding area. Finish trowel surface to match surrounding area.
- C. Cover exposed steel reinforcement with epoxy mortar, feather edges to flush surface.

3.6 APPLICATION - CEMENTITIOUS MORTAR

- A. Apply by spray, brush or roller coating of bonding agent to damp concrete surfaces. Provide full surface coverage.
- B. Apply cementitious mortar by steel trowel to average thickness as recommended by the product manufacturer. Tamp into place filling voids at spalled or voided areas. Work mix into honeycomb.
- C. Damp cure cementitious mortar for four days.

3.7 FIELD QUALITY CONTROL

- A. Section 01400 – Quality Assurance and Quality Control: Testing, inspection and analysis requirements.

END OF SECTION

**SECTION 04010
MAINTENANCE OF MASONRY**

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes required maintenance, repair or replacement of placed masonry on the job that is determined to be dirty, stained, damaged, defective or otherwise, in the opinion of the Engineer, requires additional work to meet project standards and requirements. Section includes water, steam and chemical cleaning of masonry surfaces; replacement of masonry units; sand blast cleaning of masonry surfaces; repointing mortar joints; and repair of damaged masonry.
- B. Related Sections:
 - 1. Division 3
 - 2. Division 4

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 530 - Building Code Requirements for Masonry Structures.
 - 2. ACI 530.1 - Specifications for Masonry Structures.

1.3 SUBMITTALS

- A. Section 01300 - Submittals: Submittal procedures.
- B. Product Data: Submit data on cleaning compounds and cleaning solutions.
- C. Manufacturer's Installation Instructions: Submit installation procedures for products selected for use, manufacturer's installation instructions, perimeter conditions requiring special attention.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 530 and ACI 530.1 requirements.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Division 1: Product storage and handling requirements.
- B. Deliver masonry neatly stacked and tied on pallets. Store clear of ground with adequate waterproof covering.
- C. Store sand blasting, acid solution and restoration cleaner materials in manufacturer's packaging.
- D. Store mortar ingredients in manufacturer's packaging, or when delivered loose, with adequate weatherproof covering.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Division 1.
- B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than eight mph.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Cleaning Agent: Detergent, Solvent cleaner or Acid solution.
- B. Replacement masonry materials.
 - 1. Reinforcement: Section 03200 – Concrete Reinforcement.
 - 2. Mortar and Grout: Section 04100 – Mortar and Grout.
 - 3. Masonry Units: Section 04300 – Reinforced Unit Masonry.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Division 1: Coordination and project conditions.
- B. Verify surfaces to be cleaned or restored are ready for work of this section.

3.2 PREPARATION

- A. Protect elements surrounding work of this section from damage or disfiguration.
- B. Immediately remove stains, efflorescence, or other excess resulting from work of this section.
- C. Protect roof membrane and flashings from damage.
- D. Provide dams to divert flowing water to exterior drains.
- E. Carefully remove and store fixtures, fittings, finishing hardware and accessories.
- F. Close off, seal, mask, and/or board up areas, landscaping, materials, and surfaces not receiving work of this section to protect from damage.
- G. Construct dust proof and weatherproof partitions to close off occupied areas.
- H. Masonry units that are broken or otherwise damaged and require replacement in the opinion of the Engineer.
 - 1. Saw-cut, chip-out with hand or mechanical tools all damaged or other-wise non-conforming masonry units, grout and mortar to sound clean and bare masonry surfaces.
- I. Mortar joints that are determined, in the opinion of the Engineer, to be non-conforming to Project Standards.
 - 1. Using hand or mechanical tools remove all grout to sound clean and bare masonry, grout or mortar surfaces.
 - 2. Insure surfaces to be re-grouted are clean, bare and free of dust.

3.3 INSTALLATION

- A. Cleaning New Masonry:
 - 1. Verify mortar is fully set and cured.

2. Clean surfaces and remove large particles with wood scrapers, brass or nylon wire brushes.
 3. Scrub walls with detergent solution using stiff brush. Thoroughly rinse and wash off cleaning solution, dirt and mortar crumbs using clean, pressurized water.
 4. Use acid solution mixed with water. Apply acid solution and scrub masonry with stiff fiber brushes. Do not scrub mortar joints.
 5. Protect area below cleaning operation and keep masonry soaked with water and flushed free of acid and dissolved mortar continuously for duration of cleaning.
 6. Before solution dries, rinse and remove acid solution and dissolved mortar, using clean, pressurized water.
- B. Replacing Damaged Masonry:
1. Damaged reinforcing steel to be removed and replaced with new reinforcing steel of size and spacing indicated on the plans and with laps as required.
 2. New masonry, mortar and grout to conform with Section 2.1.
 3. Replacement masonry when finished shall closely match the lines, color and texture of the adjacent remaining masonry.
- C. Replacing or re-pointing damaged mortar joints.
1. Replace or re-point mortar joints in conformance with Section 2.1.

3.4 FINAL CLEANING

- A. Section 01700 – Contract Closeout: Final cleaning.
- B. As work proceeds and on completion, remove excess mortar, smears, droppings.
- C. Clean surrounding surfaces.

END OF SECTION

**SECTION 04100
MORTAR AND GROUT**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Mortar and grout for masonry.

1.2 SUBMITTALS

- A. Samples: Submit two samples of mortar illustrating mortar color and color range.

1.3 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 530 and ACI 530.1.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Hot Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.
- B. Cold Weather Requirements: IMIAC – Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated. Portland cement shall not have an alkali content of more than 0.1% when tested according to ASTM C 114.
- B. Mortar Aggregate: ASTM C144, standard masonry type
- C. Hydrated Lime: ASTM C207, Type S
- D. Mortar Color: Mineral oxide pigment; color as selected
- E. Grout Aggregate: ASTM C404
- F. Water: Clean and potable
- G. Bonding Agent: Epoxy type

- H. Colored Cement Product: Packaged blend made from Portland cement and lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.

- 1. Formulate blend as required to produce color as selected from manufacturer's full range of standard colors.

2.2 MORTAR MIXES

- A. Mortar for Load Bearing Walls and Partitions: ASTM C270, Type S using the Property Method.
- B. Mortar for Reinforced Masonry: ASTM C270, Type S using the Property Method.
- C. Stain Resistant Pointing Mortar: One-part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate or ammonium stearate equal to two percent of Portland cement by weight.
- D. Integral Water-Repellent Mortar Admixture:
 - 1. Integral liquid polymeric admixture for mortar added during mixing. Dry-Block Mortar Admixture manufactured by Grace Construction Products. Subject to compliance with requirements, equivalent products by the following manufacturers are acceptable.
 - a. ACM Chemistries, Inc.: Rain Bloc for Mortar
 - b. BASF: Rheopel Mortar Admixture
 - c. Approved equal
- E. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
- F. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.
 - 1. Products:
 - a. Addiment Incorporated; Mortar Tite.
 - b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

- G. Water: Potable.

2.3 MORTAR MIXING

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.
- B. Add mortar color and admixtures in accordance with manufacturer's instructions.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar.

2.4 GROUT MIXES

- A. Bond Beams, Lintels and Engineered Masonry: 3,000 psi strength at 28 days; 8-inches slump; mixed in accordance with ASTM C476 Fine Grout

2.5 GROUT MIXING

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C476 Fine grout.
- B. Do not use anti-freeze compounds to lower the freezing point of grout.

2.6 MIX TESTS

- A. Test mortar and grout in accordance with Section 01400 and the General Structural Notes in the Plans.
- B. Testing of Mortar Mix: In accordance with ASTM C780.
- C. Testing of Grout Mix: In accordance with ASTM C1019.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install mortar in accordance with ASTM C780. Install grout in accordance with ASTM C1019.
- B. Work grout into masonry cores and cavities to eliminate voids. Do not displace reinforcement.

END OF SECTION

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**SECTION 04200
REINFORCED UNIT MASONRY**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
 - 1. Concrete masonry units (CMUs).
 - 2. Decorative concrete masonry units.
 - 3. Mortar and grout.
 - 4. Ties and anchors.
 - 5. Embedded flashing systems.
 - 6. Miscellaneous masonry accessories.
- B. Related Sections include the following:
 - 1. Division 07 Section "Water Repellents" for water repellents applied to unit masonry assemblies.
 - 2. Division 07 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
 - 3. Division 07 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.
 - 4. Section 03410 Precast Structural Concrete
- C. Products installed, but not furnished, under this Section include the following:
 - 1. Precast Concrete Lintels for unit masonry, furnished under Section 03410 Precast Structural Concrete.
 - 2. Manufactured reglets in masonry joints for metal flashing, furnished under Division 07 Section "Sheet Metal Flashing and Trim."

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
- C. Samples for Initial Selection: For the following:
 - 1. Decorative concrete masonry units, in the form of small-scale units representing actual colors and textures.
 - 2. Colored mortar.
- D. Samples for Verification: For each type and color of the following:
 - 1. Accessories embedded in masonry.
- E. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
 - 1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.
 - b. For exposed brick, include material test report for efflorescence according to ASTM C 67.
 - 2. Grout mixes. Include description of type and proportions of ingredients.
- F. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports, per ASTM C 780, for mortar mixes required to comply with property specification.
 - 2. Include test reports, per ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- G. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1093 for testing indicated, as documented according to ASTM E 548.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
- D. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting to protect from rain or snow. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place or construct a protective tent over the masonry walls.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 2. Protect sills, ledges, and projections from mortar droppings.
 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

3. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products.

2.2 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

2.3 CONCRETE MASONRY UNITS (CMUs)

- A. Shapes: Provide shapes indicated and as follows:
 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 2. Provide square-edged units for outside corners for exterior units, unless otherwise indicated.
 3. Provide $\frac{3}{4}$ -inch chamfer at all vertical outside corners of interior CMU walls and at all CMU jambs of door openings. Chamfer shall be by the manufacturer, no field chamfering will be allowed unless approved by the Engineer.
- B. Decorative Concrete Masonry Units: ASTM C 90.
 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
 2. Weight Classification: Normal weight.
 3. Size (Width): Manufactured to dimensions specified in "Concrete Masonry Units" Paragraph above.
 4. Pattern, Texture and Color:
 - a. Type 1: Split-face finish.
 - 1) Integral, colors as selected by Architect from manufacturer's full range-standard colors.
 - b. Type 2: Ground face finish- white cement colors.
 5. Colors for Exposed Exterior and Interior CMU: Integral colors as selected by the Architect from manufacturer's full range.

2.4 MASONRY LINTELS

- A. General: Provide either concrete or masonry lintels, where shown on the drawings, complying with requirements below.
- B. Masonry Lintels: built-in-place masonry lintels made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.
- C. Coordinate setting and placing pre-cast concrete lintels as required.

2.5 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated. Portland cement shall not have an alkali content of more than 0.1% when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Colored Cement Product: Packaged blend made from Portland cement and lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 - 1. Formulate blend as required to produce color as selected from manufacturer's full range of standard colors.
- D. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
- E. Aggregate for Grout: ASTM C 404.
- F. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.
 - 1. Products:
 - a. Addiment Incorporated; Mortar Tite.

- b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

G. Water: Potable.

2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with eight subparagraphs below, unless otherwise indicated.
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
 - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
 - 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.7 MISCELLANEOUS ANCHORS

- A. ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.8 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
 - 1. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304, 0.016 inch (0.40 mm) thick.
 - 2. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
 - 3. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at 3-inch (76-mm) intervals along length of flashing to provide an integral mortar bond.
 - 4. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
- B. Flexible Flashing: Use the following unless otherwise indicated:
 - 1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated

polyethylene film to produce an overall thickness of not less than 0.040 inch (1.02 mm).

- a. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

C. Application: Unless otherwise indicated, use the following:

- 1. Where flashing is indicated to receive counterflashing, use metal flashing.
- 2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
- 3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge or flexible flashing with a metal drip edge.
- 4. Where flashing is fully concealed, use flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings:

- 1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
- 2. Elastomeric Sealant: ASTM C 920, chemically curing urethane sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and remain watertight.

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Control Joints: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from urethane or PVC.

- 1. Basis of Design Product: Dur-O-Wal; DA2002 or approved equal.

2.10 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc.

2.11 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 1. Do not use calcium chloride in mortar or grout.
 2. Limit cementitious materials in mortar to Portland cement and lime.
 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
 1. For reinforced masonry, use Type S.
- C. Grout for Unit Masonry: Comply with ASTM C 476.
 1. Use grout of type indicated or, if not otherwise indicated, of type fine that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

2.12 SOURCE QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform source quality-control testing indicated below:
 1. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.
- B. Concrete Masonry Unit Test: For each type of unit furnished, per ASTM C 140.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. Verify that foundations are within tolerances specified.
 - 2. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- D. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.
- E. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
 - 1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
 - 2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

3.4 MORTAR BEDDING AND JOINTING

- A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.5 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry detailed on the Drawings.
- C. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch.
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.6 LINTELS

- A. Install pre-cast concrete lintels where indicated.
- B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.7 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
- C. Testing Prior to Construction: One set of tests.
- D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- F. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

3.8 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.

4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.9 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess masonry waste materials and legally dispose of off Owner's property.

END OF SECTION

DATE: 8/11/22
Project: City of Moscow, Booster Station Replacements – Phase II Rebid
Architect: B2 Architecture, Inc.



CERTIFICATE OF ARCHITECT

The technical material and specifications listed below were prepared by or prepared under the direct supervision of the undersigned, whose seals, as professional architect licensed to practice as such, are affixed below.

Specification Sections

04270	Glass Unit Masonry
07141	Cold Fluid-Applied Waterproofing & Drainage Mat System
07191	Vertical Wall Water Repellents
07210	Building Insulation
07214	Foamed-In-Place Masonry Wall Insulation
07275	Weather Barrier
07400	Metal Roof and Soffit Panels
07411	Metal Wall Panels
07461	Composite Trim
07620	Sheet Metal Flashing and Trim
07720	Snow Retention System
07920	Joint Sealants
08110	Metal Doors and Frames
08710	Door Hardware
09910	Architectural Paints and Coatings
10520	Fire Protection



8/11/22

JAMES E. LEMON, R.A. NCARB
B2 Architecture, Inc.

**SECTION 04270
GLASS UNIT MASONRY**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section includes the following:
 - 1. Work includes, but is not necessarily limited to, furnishing all labor, materials and equipment for the complete installation of glass unit masonry as specified and shown on the drawings.

1.02 RELATED WORK

- A. Section 04300 – Reinforced Unit Masonry
- B. Section 07191 – Vertical Wall Water Repellent
- C. Section 07920 – Joint Sealants

1.03 REFERENCES

- A. ASTM A 82 – Specifications for Cold Drawn Steel Wire
- B. ASTM C 144 – Specifications for Aggregate for Masonry
- C. ASTM C 150 – Specifications for Portland Cement
- D. ASTM C 207 – Specifications for Hydrated Lime for Masonry Purposes
- E. ASTM C 270 – Specification for Mortar for Unit Masonry
- F. ASTM D 1227 – Type III, Specifications for Emulsified Asphalt for Porous Surfaces

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Product Data:
 - 1. Materials description of each individual components;
 - 2. Installation instructions for each product specified. Indicate installation procedures and accessories required for a complete installation.
- C. Warranty Information: Submit specified warranty.

1.05 QUALITY ASSURANCE

- A. Single-Source: Obtain glass block from one manufacturer.

1.06 STORAGE AND PROTECTION

- A. Store unopened cartons of glass block in clean, cool, dry areas.
- B. Protect opened cartons of glass block against windblown rain or water run-off with tarpaulins or plastic covering.

1.07 PROJECT/SITE CONDITIONS

- A. Do not install glass block units when temperature is 40°F and below. Maintain the temperature of glass unit masonry above 40°F for the first 48 hours after construction.

1.08 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Manufacturer's Product Warranty: Submit a written warranty, for Owners acceptance, executed by the manufacturer agreeing to repair and replace, at no cost to the Owner, faulty material within the specified warranty period.
 - 1. Warranty Period: 5 years
- C. Installation Warranty: Submit a written warranty, for Owners acceptance, executed by the contractor agreeing to repair and replace, at no cost to Owner, faulty materials and installation within the specified warranty period.
 - 1. Warranty Period: 2 years.

PART 2 - PRODUCTS

2.01 HOLLOW GLASS BLOCK

- A. Description: Hollow units mad or colorless glass, PVD-coated at edges, for vertical installation as an opening in a wall.
 - 1. Partially evacuated hollow units with polyvinyl butyral edge coating.
 - 2. Nominal Face Dimensions: 8" wide x 8" tall x 4" deep.
 - 3. Pattern: Smooth/Flat (no waves or patterns)
 - 4. Locations: See Construction Drawings, Architectural Plans.

2.02 MORTAR MATERIALS

- A. Mortar: Type S in accordance with ASTM C 270. Mortar shall be 1 part Portland Cement, ½ part lime, and sand equal to 2 ¼ to 3 times the amount of cementitious material (cement plus lime), all measured by volume.

1. Portland Cement: Type 1 in accordance with ASTM C 150. If a waterproof cement is used, the integral type waterproofer shall be omitted. (Masonry Cement is not recommended)
 2. Lime: Shall be a dolomitic pressure-hydrated lime, special hydrate, Type S, in accordance with ASTM C 207.
 3. Sand: A clean, white quartzite or silica type, essentially free of iron compounds, in accordance with ASTM C 144, not less than 100% passing a No. 8 sieve.
 4. Integral Type Water-Repellent: Stearate type by The Euclid Chemical Company (Integral Waterpeller Powder, Not Liquid or equal. Note: Add integral Waterpeller Powder to dry mortar mix. Do not add powder to wet mortar mix.
- B. With integral water repellent.
- C. No antifreeze compounds or accelerators allowed.

2.03 ACCESSORIES

- A. Panel Reinforcing: Type 304 stainless steel, two parallel 9-gauge wires 2 inches on center with electrically but-welded cross-wires spaces at regular intervals.
- B. Panel Anchors: Type 304 stainless Steel perforated strips 16 inches + long by 1 ¾ inches.
- C. Expansion Strips: Made of polyethylene foam with a thickness of 3/8 inch.
- D. Asphalt Emulsion: A water-based, non-fibred asphalt emulsion by Karnack Chemical Corporation, Karnak 100 or equal.
- E. Spacers: Plastic 3/8 inch block spacers with twist off alignment tabs.
- F. Sealant: Non-staining, waterproof mastic, urethane type.
 1. Color: To match adjacent CMU joint mortar (white not allowed).
- G. Packing (Backer Rods): Polyethylene foam, neoprene, fibrous glass or equal as approved by sealant manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify that panel anchors have been provide at head and jambs for the purpose of providing panel support within the opening.
- B. Mix all mortar components to a consistency that is drier than mortar for ordinary masonry. Retempering the mortar after it has taken its initial set shall not be permitted.
- C. Do not use antifreeze compounds or accelerators.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's written instructions.
- B. Cover sill area with heavy coat of asphalt emulsion. Allow emulsion to cure at least 2 hours before placing mortar.
- C. Install panel anchors in the same joints where panel reinforcing will be laid.
 - 1. Jambs: 8 inches o.c. maximum starting after first course.
 - 2. Head: 16 inches o.c. maximum starting after first course.
 - 3. Panel anchors are to be embedded a minimum of 12 inches into the mortar joints.
- D. Place or adhere expansion strips to jambs and head. Mark certain expansion strip extends to sill and covers leg of panel anchor that is attached to jabs and head.
- E. Set a full mortar bed joint, applied to sill.
- F. Set lower course of block. Maintain a uniform joint width of 3/8 inch (match adjacent cmu joints) plus or minus 1/8 inch. All mortar joints must be full and not furrowed. Steel tools must not be used to tap block into position. (place a rubber crutch tip on end of trowel to tap block into position. Do not realign, tap or otherwise move block after initial placement.
- G. Use 3/8" spacers that provide a 3/8 inch thick mortar joint.
- H. Install panel reinforcing every 8 inches o.c. maximum starting with first course in the horizontal mortar joints and 16 inches o.c. maximum starting with first course in the vertical mortar joints. Run reinforcing continuously from end to end of panels. Lap reinforcing not less than 6 inches whenever it is necessary to use more than one length. Install reinforcing as follows:
 - 1. Place lower half of mortar in bed joint. Do not furrow.
 - 2. Press panel reinforcing into place.
 - 3. Cover panel reinforcing with upper half of mortar bed and trowel smooth. Do not furrow.
- I. Place full mortar bed for joints not requiring panel reinforcing do not furrow. Maintain uniform joint width.
- J. Set succeeding courses of block. Spaces at head of panel and jambs must remain free of mortar for caulking with sealant.
- K. Use only wooden or rubber tipped tools with tapping glass blocks into place.
- L. Mortar Joints:
 - 1. Interior Side: Tool joints flush with face of glass block while mortar is still plastic and before final set. Remove surplus mortar from faces of glass block and wipe

dry. Tool joints smooth and concave before mortar takes final set. At this time, remove and clean out all excess mortar from jambs, head and other locations.

2. Exterior Side: Rake all joints clean to depth of 3/8" – 1/2" deep while mortar is still plastic and before final set to prepare to continuous bead of color sealant at exterior joints. Remove surplus mortar from faces of glass block and wipe dry. At this time, remove and clean out all excess mortar from jambs, head, joints and other locations.
- M. After final mortar set (approximately 24 hours), install packing tightly between glass block panel and jamb head locations as needed. Leave space for sealant at all joints.
- N. Apply sealant evenly to the full depth of recesses as indicated on the drawings and in accordance with the manufacturers' published application manual and instructions.
- O. All exterior glass block panels shall be well sealed to prevent water entry.

3.03 ADJUSTING, CLEANING AND PROTECTION

- A. Remove surplus mortar from the faces of the glass block at the time of joints are stuck or tooled. Mortar should be removed while it is still plastic using a clean, wet sponge or an ordinary household scrub brush with stiff bristles.
- B. Do not use harsh cleaners, acids of any strength, abrasives or alkaline materials with cleaning glass block. Never use wire brush to remove mortar from glass block surfaces.
- C. Final mortar removal is accomplished with a clean, wet sponge or cloth. Rinse sponge or cloth frequently in clean water to remove abrasive particles that could scratch glass surfaces. Allow any remaining film on the block to dry to a powder.
- D. After all sealants, caulking, etc., have been applied, remove excess caulking materials with commercial solvents such as xylene, toluene mineral spirits or naphtha and follow with normal wash and rinse. Be careful not to damage caulking by overgenerous application of strong solvents. Comply with solvent manufacturers' printed directions on label for toxicity and flammability warnings.
- E. Final cleaning of glass block panels is accomplished after they are completely installed. Wait until panels are not exposed to direct sunlight. Start at the top of the panel and wash with generous amounts of clean water. Dry all water from the glass block surface. Change cloth frequently to eliminate dried mortar particles or aggregate that could scratch the glass surface. To remove the dry powder from the glass surfaces, use a clean, dry, soft cloth. For stubborn or hard to remove powder or stain, the use of an "extra fine" steel wool (grades 000 or 0000) is suggested. Try this first in an unobtrusive area.
- F. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

SECTION 04270 – 5

GLASS UNIT MASONRY

**SECTION 05500
METAL FABRICATIONS**

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes shop fabricated metal items.
 - 1. Entrance canopy roof support knee-frames.
 - 2. Bollards
 - 3. Miscellaneous piping and duct support frames
 - 4. Miscellaneous metal items and fabrications not otherwise covered in the Plans or Specifications
 - 5. Anchors for Equipment
 - 6. Metal Access Gate
- B. Related Sections:
 - 1. 02830 – Chain Link Fencing
 - 2. Division 3
 - 3. Division 4
 - 4. Division 5
 - 5. Division 9

1.2 REFERENCES

- A. Aluminum Association:
 - 1. AA DAF-45 - Designation System for Aluminum Finishes
- B. American Architectural Manufacturers Association:
 - 1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum
- C. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel

2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
3. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
5. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
6. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
7. ASTM A297/A297M - Standard Specification for Steel Castings, Iron-Chromium and Iron-Chromium-Nickel, Heat Resistant, for General Application
8. ASTM A283/283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
9. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
10. ASTM A312/A312M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes
11. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
12. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
13. ASTM A479/A479M - Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
14. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
15. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
16. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing
17. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts
18. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

19. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings
 20. ASTM B85 - Standard Specification for Aluminum-Alloy Die Castings
 21. ASTM B177 - Standard Guide for Chromium Electroplating on Steel for Engineering Use
 22. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 23. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes
 24. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire
 25. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 26. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
 27. ASTM F436 - Standard Specification for Hardened Steel Washers
 28. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
- D. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination
 2. AWS D1.1 - Structural Welding Code - Steel
 3. AWS D1.6 - Structural Welding Code - Stainless Steel
- E. National Ornamental & Miscellaneous Metals Association:
1. NOMMA Guideline 1 - Joint Finishes
- F. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual
 2. SSPC SP 1 - Solvent Cleaning
 3. SSPC SP 10 - Near-White Blast Cleaning
 4. SSPC Paint 15 - Steel Joist Shop Paint

5. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic)

1.3 SUBMITTALS

- A. Section 01300 – Submittals: Submittal requirements.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Division 1: Product storage and handling requirements.
- B. Accept metal fabrications on site in labeled shipments. Inspect for damage.
- C. Protect metal fabrications from damage by exposure to weather.

1.5 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on Drawings.

PART 2 PRODUCTS

2.1 MATERIALS – STEEL

- A. Steel Sections: ASTM A572/A572M; Grade 50.
- B. Steel Plate: ASTM A36/A36M.
- C. Hollow Structural Sections: ASTM A500, Grade B.
- D. Steel Pipe: ASTM A53/A53M, Grade B Schedule 40.
- E. Sheet Steel: ASTM A653/A653M, Grade 33 Structural Quality with galvanized coating.
- F. Bolts: ASTM A307; Grade A or B.
 - 1. Finish: Hot dipped galvanized.
- G. Nuts: ASTM A563 heavy hex type.
 - 1. Finish: Hot dipped galvanized.
- H. Washers: ASTM F436; Type 1.

1. Finish: Hot dipped galvanized.
- I. Welding Materials: AWS D1.1; type required for materials being welded.
- J. Shop and Touch-Up Primer: SSPC Paint 15, Type 1, red oxide.
- K. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic zinc rich.

2.2 MATERIALS - STAINLESS STEEL

- A. Bars and Shapes: ASTM A276; Type 316.
- B. Tubing: ASTM A269; Type 316.
- C. Pipe: ASTM A312/A312M, seamless; Type 316.
- D. Plate, Sheet and Strip: ASTM A167; Type 316.
- E. Bolts, Nuts, and Washers: ASTM A354.
- F. Welding Materials: AWS D1.6; type required for materials being welded.

2.3 MATERIALS – ALUMINUM

- A. Extruded Aluminum: ASTM B221, Alloy 6063, Temper T5.
- B. Sheet Aluminum: ASTM B209, Alloy 6063, Temper T5.
- C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210, Alloy 6063, Temper T6.
- D. Aluminum-Alloy Bars: ASTM B211, Alloy 6063, Temper T6.
- E. Bolts, Nuts, and Washers: Stainless steel.
- F. Welding Materials: AWS D1.1; type required for materials being welded.

2.4 MATERIALS – BLIND SIDE FASTENERS

- A. Where bolted connections are indicated to be made to HSS shapes or other places where access is unavailable to the backside of the fastener provide Type HB - Hollo-Bolt by Lindapter or approved equal.
- B. Bolt size shall be as indicated on the Plans for the thickness of materials to be joined as indicated. Install bolts per the manufacturer's specifications. Provide stainless steel fasteners for all exterior applications and where indicated.

2.5 COORDINATION:

A. Entrance canopy roof support knee-frames.

1. Number, size and location as indicated on the drawings.
2. Welded steel construction. Pieces as indicated on the drawings to be welded together shall be fully seal welded together with largest size weld suitable for the thickness of metal specified. Joints to be ground flush for a smooth even finish.
3. Coordinate anchor placement with masonry contractor.
4. Painted finish per Division 9.

B. Bollards

1. Bollards: Steel pipe, concrete filled where indicated, crowned cap, 6-inches diameter, length as indicated on Drawings; prime paint plus one coat of high-visibility yellow paint.
2. Concrete Fill: Mix number M400-STD per General Concrete Notes on the Project Drawings and as specified in Section 03300.
3. Anchors: Concealed type as indicated on Drawings.
4. Removable Bollards:
 - a. Provide manufacturers standard removable bollard compete with metal sheath to be imbedded into concrete floor with protective self-closing lid.
 - b. Reliance Foundry Model R-8902 or equivalent.

C. Metal Access Gate:

1. Swinging metal access gates of size and dimensions indicated on the drawings.
2. Hinges to be weld-on heavy duty Roller Cage Bearing type hinges with a minimum load capacity of 3,000-lbs per pair.
3. Removable center bollard with embedded pipe sleeve as indicated on the drawings.
4. Locking tabs that align on both the center bollard and end of each swing gate. Capable of being locked together with a standard padlock of the owners choosing.

D. Steel pipe support frames.

1. Fabricated steel support frames of size and quantity indicated on the plans.
 2. Coordinate floor to pipe invert elevations with the Project Engineer and Contractor and approved piping submittals.
 3. Manufacturer's standard seismically braced support frame may be substituted with approval from the Project Engineer.
 4. All hot-dip galvanized construction.
- E. Miscellaneous piping and duct support frames.
1. Provide where indicated on the Drawings or required to provide safe/stable support to piping and ducting for both gravity, dynamic and seismic loads.
 2. Steel per Article 2.1 of this Specification.
 3. Hot-dip galvanized where noted on the Drawings.
 4. Three coat paint system per Section 09900 – High Performance Coatings, where not otherwise indicated on the Drawings.
- F. Equipment Support Anchors.
1. Size and length as indicated on the plans or as recommended by the equipment supplier.
 2. Coordinate with approved equipment submittals.
 3. Stainless steel or hot-dip galvanized finish.

2.6 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.7 FACTORY APPLIED FINISHES – STEEL

- A. Galvanizing: ASTM A123/A123M; minimum 2.0 ounce/square foot coating thickness; galvanize after fabrication.
 - 1. Galvanizing for Fasteners, Connectors, and Anchors:
 - 2. Hot-Dipped Galvanizing: ASTM A153/A153M.
- B. Painted: Provide three coat paint system per Section 09900 – High Performance Coatings, where finish is not otherwise indicated on the Drawings.

2.8 FACTORY APPLIED FINISHES - STAINLESS STEEL

- A. Satin Polished Finish: Number 4, satin directional polish parallel with long dimension of finished face.

2.9 FACTORY APPLIED FINISHES – ALUMINUM

- A. Finish coatings to conform to AAMA 2603. Comply with AA DAF-45.
- B. Exterior Aluminum Surfaces: AAMA A41 anodized, prepared with chemical pre-treatment, anodized to clear color.

2.10 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch per 48 inches.
- E. Maximum Deviation from Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Division 1: Coordination and project conditions.
- B. Verify field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

- A. Clean and strip galvanized steel items to bare metal where site welding is required. After welding coat affected surfaces with a cold galvanizing compound.
- B. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.
- C. Field weld components only as indicated on Drawings.
- D. Perform field welding in accordance with AWS D1.1.
- E. Obtain approval of Engineer prior to site cutting or making adjustments not scheduled.
- F. After erection, touch up welds, abrasions, and damaged finishes with galvanizing repair paint to match shop finishes.

3.4 ERECTION TOLERANCES

- A. Section 01400 - Quality Assurance and Quality Control: Tolerances.
- B. Maximum Variation from Plumb: 1/4 inch per story or for every 12 feet in height whichever is greater, non-cumulative.
- C. Maximum Offset from Alignment: 1/4 inch.
- D. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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**SECTION 06100
ROUGH CARPENTRY**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Framing for all roof and canopy structures.
 - 2. Framing for Skylight walls and supports.
 - 3. Wood blocking and nailers.
 - 4. Plywood backing panels.
 - 5. Miscellaneous materials.
- B. Related Sections include the following:
 - 1. Division 6 Section "Sheathing."

1.3 DEFINITIONS

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. WWPA: Western Wood Products Association.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPAC2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPAC31 with inorganic boron (SBX). (Clarification: Only the wood plate that is in contact with the concrete needs to be constructed with wood preservative treated lumber.)
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, and similar concealed members in contact with concrete or concrete masonry construction.

2.3 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 19 percent.
- B. Exterior and Load-Bearing Walls: No. 2 and better grade and the following species:
 - 1. Douglas fir-larch; WCLIB or WWPA.
- C. Joists, Rafters and Other Framing Not Listed Above: No. 2 and better grade and the following species:
 - 1. Douglas fir-larch; WCLIB or WWPA.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including but not limited to the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Furring.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content and the following species:

1. Douglas fir-larch; WCLIB or WWPA.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:
1. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.
- D. For blocking not used for attachment of other construction, No. 2 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.5 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in 5/8-inch nominal thickness.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.7 METAL FRAMING ANCHORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Alpine Engineered Products, Inc.
 2. KC Metals Products, Inc.
 3. Simpson Strong-Tie Co., Inc.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
- D. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base. Provide type and size as indicated on the Drawings.

2.8 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Adhesives for Gluing to Concrete: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- E. Do not splice structural members between supports, unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated on the Drawings.
- J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive

finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 MISCELLANEOUS FRAMING INSTALLATION

- A. Provide special framing as indicated for soffits, eaves, overhangs, dormers, and similar conditions as indicated on the drawings.

3.4 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

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SECTION 06160
WOOD SHEATHING

PART 1 - GENERAL

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing., Interior & exterior.
 - 2. Roof sheathing.
 - 3. Ceiling Sheathing.
 - 4. Sheathing joint and penetration treatment.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for plywood backing panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- B. Factory mark panels to indicate compliance with applicable standard.

2.2 WALL SHEATHING

- A. Plywood Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.
 - 1. Nominal Thickness: Not less than 1/2 inch (13 mm).
 - 2. Size: 48 by 96 inches for vertical installation.
- B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.
 - 1. Nominal Thickness: Not less than 1/2 inch (13 mm).
- C. Interior surfaces, exposed to view, provide smooth sanded surface.

2.3 ROOF & CEILING SHEATHING

- A. Plywood Sheathing: DOC PS 1, Exterior, Structural I sheathing.
 - 1. Span Rating: As shown on drawings.
 - 2. Nominal Thickness: Not less than 5/8 inch (16 mm).
- B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.
 - 1. Span Rating: As shown on drawings.
 - 2. Nominal Thickness: Not less than 5/8 inch (16 mm).
- C. Interior surfaces, exposed to view, Type ACX Plywood, provide smooth sanded surface.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
 2. For roof and wall sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- B. Nails, Brads: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
 2. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall and Roof Sheathing:
 - a. Nail to wood framing.
 - b. Screw to cold-formed metal framing.
 - c. Space panels 1/8 inch (3 mm) apart at edges and ends.

END OF SECTION

SECTION 06175
SHOP-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes Shop-fabricated wood trusses for roof framing; bridging, bracing, and anchorage; and preservative treatment of wood. Shop-fabricated wood trusses may also be called Pre-engineered wood trusses on the plans. The terms "Shop-fabricated" and "Pre-engineered Wood" trusses may be used interchangeably and shall be considered one and the same when used.
- B. Related Sections:
 - 1. Section 06100 - Rough Carpentry.
 - 2. Section 06160 – Wood Sheathing.
 - 3. Section 04200 – Reinforced Unit Masonry.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A208.1 - Mat-Formed Wood Particleboard.
- B. APA-The Engineered Wood Association:
 - 1. APA/EWA TB 200 - Fire Retardant Treated Plywood.
- C. American Wood-Preservers' Association:
 - 1. AWWA M4 - Standard for the Care of Preservative-Treated Wood Products.
 - 2. AWWA U1 - Use Category System: User Specification for Treated Wood.
- D. ASTM International:
 - 1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 2. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

3. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 4. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
 5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 6. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 7. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- E. Truss Plate Institute:
1. TPI 1 - National Design Standard for Metal Plate Connected Wood Truss Construction.
- F. U. S Department of Commerce National Institute of Standards and Technology:
1. DOC PS 1 - Construction and Industrial Plywood.
 2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
 3. DOC PS 20 - American Softwood Lumber Standard.
- G. West Coast Lumber Inspection Bureau:
1. WCLIB - Standard Grading Rules for West Coast Lumber.
- H. Western Wood Products Association:
1. WWPA G-5 - Western Lumber Grading Rules.

1.3 SYSTEM DESCRIPTION

- A. Design Roof Live and Dead Load: As indicated in Design Criteria in the General Structural Notes section of the Drawings.
- B. Deflection limits to be as listed in the Pre-Engineered/Fabricated Wood Truss section in the General Structural Notes section of the Drawings.
- C. Snow Drifting for Gable Roof Configurations.
 1. When noted on the plans design for snow drifting & sliding loads indicated.
 2. When not indicated on the plans, truss designer to calculate unbalanced snow loads due to the effects of wind-driven snow in accordance with Chapter 7 of ASCE-7.

3. Refer to Figure 7-5 of ASCE-7.
- D. Design of Gable End Wall Trusses for Wind Perpendicular to Truss face.
1. Special design shall be provided for vertical wall studs in Gable End Wall trusses where the height of the stud exceeds 6'-8".
 2. Special design shall be for combined Wind Lateral Loading plus Vertical Axial Loads due to Roof Dead and Live Loads; Wind Lateral Load shall be applied as a Load Perpendicular to the face of the truss.
 3. Wind Load shall be in accordance with ASCE-7 or a minimum of 30 psf.
 4. Design shall be in accordance with the NDS for Wood Construction, current edition.
 5. Submit complete calculations for this design per Section 1.4.
- E. Temporary and Permanent Bracing for trusses with spans greater than 60-ft.
1. The Truss manufacturer shall include in his design all Temporary Construction Erection Bracing and Permanent Performance Bracing required for the safe installation of long span trusses.
 2. If the Truss Manufacturer is unable to provide this design service, then they will inform both the Contractor and Project Engineer in writing that they can't provide this service.

1.4 SUBMITTALS

- A. Section 01300 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate sizes and spacing of trusses and associated components, web and chord sizes, plate sizes, fastener descriptions and spacing, loads and truss cambers, and framed openings. Submit design calculations.
- C. Product Data: Submit truss configurations, bearing and anchor details, bridging and bracing requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
1. Lumber Grading Agency: Certified by DOC PS 20.
 2. Plywood Grading Agency: Certified by APA/EWA.

- 3. Lumber: DOC PS 20.
- 4. Wood Structural Panels: DOC PS 1 or DOC PS 2.
- B. Truss Design, Fabrication, and Installation: In accordance with TPI 1.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years of experience.
- B. Design trusses under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Idaho.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 – Material and Equipment: Product storage and handling requirements.
- B. Store truss depth in vertical position resting on intermittent bearing pads.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Lumber Grading Rules: WCLIB or WWPA G-5.
- B. Wood Members: Single top and bottom chord, Douglas Fir/Larch species, number 2 or better. 19 percent maximum and 7 percent minimum moisture content. Finger scarfing not permitted.
- C. Plywood Plate: APA/EWA Rated Sheathing Structural I, Grade C-D, Exposure Durability 1 or 2; sanded or un-sanded.
- D. Steel Plate Connectors: TPI 1, Section 6; hot dip galvanized; die stamped with integral teeth.
- E. Truss Bridging: Type, size and spacing recommended by truss manufacturer.

2.2 ACCESSORIES

- A. Wood Blocking, Plating, Support Members, Framing for Openings: In accordance with Section 06100 – Rough Carpentry or 06160 – Wood Sheathing.
- B. Fasteners and Anchors:

1. Fasteners: ASTM A153/A153M, hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
2. Nails and Staples: ASTM F1667.
3. Anchors: As indicated on the plans.

2.3 FABRICATION

- A. Fabricate trusses to achieve structural requirements specified.
- B. Fabricate top chord extensions as indicated on Drawings.
- C. Fabricate to achieve end bearing dimensions as indicated on the drawings.

2.4 SOURCE QUALITY CONTROL

- A. Inspect Work performed at fabricator's facility to verify conformance to Contract Documents.
- B. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
 1. Specified shop inspections are not required for Work performed by approved fabricator.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify supports and openings are ready to receive trusses.

3.2 PREPARATION

- A. Coordinate placement of bearing plates and support items.

3.3 ERECTION

- A. Set members level and plumb, in correct position.
- B. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure plumb, and in alignment until completion of erection and installation of permanent bracing.
- C. Do not field cut or alter structural members without approval of Engineer.

- D. Install and brace trusses according to TPI recommendations, as indicated and in accordance with the manufacturer's written instructions.
- E. Place headers and framing anchors to frame openings.
- F. Frame openings between trusses with lumber in accordance with Section 06112.
- G. Coordinate placement of sheathing with work of this Section.
- H. After erection, touch-up damaged surfaces with primer consistent with shop coat.

3.4 ERECTION TOLERANCES

- A. Framing Members: **1/2** inch maximum, from indicated position.

END OF SECTION

SECTION 07141
COLD FLUID-APPLIED WATERPROOFING & DRAINAGE MAT SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Work includes, but is not necessarily limited to, furnishing all labor, materials and equipment for the installation of exterior below grade cold-applied elastomeric waterproofing membrane system designed for use on vertical and horizontal concrete substrates and drainage mat/protection system.

B. Related Sections:

1. Division 02 – Site Work
2. Section 03300 – Cast-In-Place Concrete

1.2 REFERENCES

A. ASTM International (ASTM):

1. ASTM C 836 – Standard Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
2. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.
3. ASTM D 4258 - Standard Practice for Surface Cleaning Concrete for Coating.
4. ASTM D 4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
5. ASTM D 4716 - Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
6. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials.

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AND DRAINAGE MAT SYSTEM**

1.3 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Product Data: Submit manufacturer's technical bulletins and SDS on each product.
- C. Submit list of project references as documented in this Specification under Quality Assurance Article. Include contact name and phone number of person charged with oversight of each project.
- D. Qualification Data:
 - 1. As specified under Quality Assurance.
 - 2. Certification of manufacturer's approval of installer.
- E. Warranty:
 - 1. Sample of unexecuted manufacturer and installer special warranties

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A manufacturer-approved firm with minimum 5 years' experience in installation of specified products in successful use on similar projects, employing workers trained by manufacturer, including a full-time on-site supervisor with a minimum of 5 years experience installing similar work, and able to communicate verbally with Contractor and employees.
- B. Manufacturer Qualifications: A qualified manufacturer with minimum ten years' experience in manufacture of waterproofing as one of its principal products.
 - 1. Manufacturer's product submitted has been in satisfactory operation on five similar installations for at least five years.
 - 2. Applicator: Minimum of 5 years experience in application of similar systems and products on projects of similar size and scope.
 - a. Successful completion of a minimum of 5 projects of similar size and complexity to specified work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

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- C. Store tightly sealed coating system materials off ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.
- D. Store in unopened containers in clean, dry conditions at 40 degrees F (4 degrees C) to 80 degrees F (27 degrees C).

1.6 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Ensure that substrate surfaces are dry, and ambient air temperatures are 40 degrees F (4 degrees C) to 90 degrees F (32 degrees C) at application time and remain above 40 degrees F (4 degrees C) for at least 24 hours after application. Ensure that frost or frozen surfaces are thawed and dry.
 - 2. Do not apply coatings if snow, rain, fog, and mist is anticipated within 12 hours after application. Allow surfaces to attain temperature and conditions specified before proceeding with coating application.
 - 3. Do not apply over sealant joints, control joints, or other materials that will be affected by solvent.
 - 4. Avoid application when inclement weather is present or imminent.
 - 5. Do not apply membrane to reinforcing bars or to wet or contaminated surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product:
 - 1. Tremco, Inc., Commercial Sealants and Waterproofing Division.
- B. Subject to compliance with requirements within this section, equivalent products by the following manufacturer are acceptable.
 - 1. W.R Meadows
 - 2. BASF Corporation

2.2 MATERIALS

- A. Cold Fluid-Applied Waterproofing: Single-component, high solids bitumen-modified polyurethane, elastomeric waterproofing membrane for exterior below-grade available in 3 grades for application by trowel, roller, and spray. Coal-tar free formulated for application to damp and green concrete.
 - 1. Basis of Design Product:
 - a. Tremco, Inc. Tremproof 250GC.

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- b. Hardness, ASTM D 2240: 70-80.
- c. Low Temperature Flexibility and Cracking Bridging: ASTM C 1305: Pass.
- d. Adhesion in Peel, ASTM C 794: 26 lbf/in.

2. Color: Black

B. Drainage Mat/Protection System: Two-layer drainage mat that consists of a polystyrene core and a spun-bonded polypropylene filter fabric.

- 1. Basis of Design Product:
 - a. Tremco, Inc. TremDrain
 - b. Flow Rate: 165 gpm/ft² (ASTM D4491)
 - c. Material: Polystyrene
 - d. Thickness: ¼"
 - e. Compressive Strength: 11,000 lbs/ft² (ASTM D1621)

2.3 PERFORMANCE REQUIREMENTS

- A. General: Waterproofing system shall be capable of performing as a continuous watertight installation and as a moisture drainage plane transitioned to adjacent flashings and discharging water to the building exterior. Waterproofing shall accommodate normal substrate movement and seal expansion and control joints, construction material transitions, opening transitions, penetrations, and perimeter conditions without resultant moisture deterioration.
- B. Compatibility: Provide waterproofing system materials that are compatible with one another and with adjacent materials under conditions of service and application required, as demonstrated by waterproofing manufacturer based on testing and field experience.

2.4 ACCESSORIES

- A. General: Accessory materials as described in manufacturer's written installation instructions, recommended to produce complete waterproofing system meeting performance requirements, and compatible with waterproofing material and adjacent materials.
- B. Substrate Patching Material: Waterproofing manufacturer's standard trowel-grade filler material.
- C. Primer: Liquid primer meeting VOC limitations and recommended for substrate by waterproofing manufacturer.
- D. Joint Sealant: ASTM C 719, high performance, medium-modulus, low-VOC, UV-stable, on-sag polyurethane sealant approved by waterproofing manufacturer for adhesion and compatibility with waterproofing and accessories.

SECTION 07141- 4 COLD FLUID-APPLIED WATERPROOFING AND DRAINAGE MAT SYSTEM

1. Basis of Design Product: Tremco, Dymonic 100.
- E. 3M Holdfast 70 Spray Adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Surface Conditions: Before applying waterproofing materials, examine substrate and conditions to ensure substrates are fully cured, smooth, clean, dry, and free from high spots, depressions, loose and foreign particles and other deterrents to adhesion, and conditions comply with manufacturer's written recommendations.
 1. Verify concrete surfaces are free from release agents, curing agents, laitance, and other contaminants. Test for waterproofing adhesion per manufacturer's recommended method. Notify Architect of unsatisfactory conditions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INTERFACE WITH OTHER WORK

- A. Sequencing of Work: Coordinate sequencing of waterproofing work with work of other sections that form portions of building envelope moisture control to ensure that flashings and transition materials can be properly installed and inspected.
- B. Subsequent Work: Coordinate waterproofing work with work of other sections installed subsequent to waterproofing to ensure complete inspection of installed waterproofing and sealing of waterproofing penetrations necessitated by subsequent work.

3.3 SURFACE PREPARATION

- A. Determine final grade location along all vertical concrete walls to receive waterproofing and drainage mat. Mark or snap line along grade elevations to ensure clean and exact placement of materials and to ensure they do not continue past final grade elevation. Tape and mask portions of concrete wall not to receive waterproofing material.
- B. Properly cure new concrete minimum of 14 days. Mechanically remove membrane-curing compounds.
- C. Patch voids and deep depressions in substrates with appropriate patching material before applying waterproofing membrane.
- D. Carefully work material over irregular concrete to avoid pinholes and holidays
- E. Remove dust, dirt, and other contaminants just before or during application. Ensure surfaces are dry at the time of application.

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- F. Open air-void pockmarks or honeycombs up to allow waterproofing membrane to fill cavities completely. Air entrapment within voids may cause blisters. Extreme cases may require a parge coat.
- G. Install continuous bead of Tremco, Dymonic 100 polyurethane sealant along joint created where at the bottom of the foundation wall meets the top of the footing. Install compatible sealant prior to start of waterproofing. At time of Applying waterproofing system ensure coating is continuous down foundation wall, over sealed joint horizontal over the top of the footing and down the face of the footing.

3.4 PRESTRIPING

- A. Before applying final membrane, seal joints, cracks, and openings around protrusions by caulking or prestriping (a preliminary coating of waterproofing membrane applied with trowel or stiff bristled brush). Allow drying overnight before applying final membrane.
- B. When final membrane is applied, verify overall thickness over joints and cracks and around penetrations of approximately 100 wet mils (2.5 mm) on standard system.
- C. Static Joints and Cracks: Fill joints and cracks less than 1/16 inch (1.6 mm) by prestriping. Apply material so it both fills and overlaps joint or crack to 4 inch (102 mm) width on each side.

3.5 APPLICATION

- A. Standard System:
 - 1. For horizontal applications, empty contents of pail and spread immediately to ensure workability. Best results are obtained by marking off 125 square foot (11.61 square m) areas and evenly spreading contents of 5 gallon (18.93 L) unit with rubber-edged notched squeegee. Repeat above procedure until entire surface is covered.
 - 2. For vertical applications, apply by trowel, roller, or spray at rate of 25 square feet per gallon (0.6 square m per L). Best results are obtained by marking off 125 square foot (11.61 square m) areas and evenly applying contents of 5 gallon (18.93 L) pail.
 - 3. Verify applied thickness with wet mil gauge as Work progresses.
- B. Extend of waterproofing and drainage map application:
 - 1. All backfilled concrete walls on the North, West and South sides of the State Way Pump House.

SECTION 07141– 6 COLD FLUID-APPLIED WATERPROOFING AND DRAINAGE MAT SYSTEM

2. Waterproofing shall extend from final grade line, down vertical foundation wall, horizontal over top of footing and down vertical face of footing to bottom edge of footing where bottom of foundation drain will be located.

3.6 CURING

- A. Appreciable properties develop within 24 to 48 hours at 75 degrees F (24 degrees C) and 50 percent relative humidity. Protect waterproofing membrane during curing.

3.7 INSTALLATION OF DRAINAGE MAT/PROTECTION COURSE

- A. Install tightly butted drainage mat/protection system as soon as possible following cure of membrane. Install drainage mat material down entire wall continuing down over top of footing and vertical face of footing. Terminate/start at base of footing where foundation drain will be located.
- B. Install drainage with filter fabric facing the installer. The seams should tightly abut or slightly overlap the flange so that the filter fabric overlaps. The seams should then be taped with underground rated tape as recommended by manufacture.
- C. If the seams are align horizontally, the seam shall be place such that the fabric creates a ship lap. The drainage mat may be adhered with 3M holdfast 70 spray adhesive, fastened above the cold fluid membrane termination or insulation pins may be adhered to the waterproofing and the drainage installed against the pins. The drainage may also be held in place by slowly backfilling during installation. NOTE: Do not disturb or mechanically fasten/penetrate waterproofing membrane.
- D. At the grade line, using a utility knife, cut back four inches of the core taking care not to cut the fabric. Fold the fabric back behind the core so that the top of the drainage is completely covered to prevent any backfill material from entering the core.

3.8 CLEANING AND PROTECTION

- A. Remove temporary coverings and protection from adjacent Work areas. Clean up areas not to be coated of over-spray and droppings. Remove construction debris from project site.
- B. Clean tools and equipment immediately after application with manufacturer's recommended cleaning solution.

END OF SECTION

SECTION 07141– 7 COLD FLUID-APPLIED WATERPROOFING AND DRAINAGE MAT SYSTEM

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**SECTION 07141– 8 COLD FLUID-APPLIED WATERPROOFING
AND DRAINAGE MAT SYSTEM**

SECTION 07191
VERTICAL WALL WATER REPELLENT

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section includes the following:
 - 1. Covers the preparation, materials, services and equipment required in conjunction with the application of a clear water repellent on all (exposed and concealed) above-grade, vertical, exterior and interior (if specified in Room Finish Schedule) surfaces of concrete and masonry.

1.02 RELATED WORK

- A. Division 3 – (Vertical) Concrete.
- B. Division 4 - Masonry.

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Product Specification Data: For the following:
 - 1. Manufacturer's technical literature, specifications, and application instructions for the specified clear water repellent material.
- E. Informational Data:
 - 1. Test Reports:
 - 2. Applicator Qualifications Data: Submit certification stating applicator has a minimum of three (3) years experience using the specified product. Provide a list of several most recently completed projects where the specified material was used. Including the project name, location, architect or engineer, and method of application.
 - 3. Manufacturer's instructions.
- F. Closeout Data (Section 01700):
 - 1. Maintenance Data:
 - 2. Warranty: Submit specified warranty.

1.04 QUALITY ASSURANCE

- A. Single-Source: Obtain clear water repellent from one manufacturer.
- B. Applicator Qualifications: A firm with no less than three (3) years experience in the application of the products specified in this section. In addition, applicator must state the intended use of the proper application equipment and that it has been well maintained.
- C. Manufacturer Qualifications: A firm with no less than ten (10) years experience in manufacturing the products specified in this section.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Material Delivery: Deliver materials to the job site in original sealed containers, clearly marked with manufacturer's name, brand name, and type of material.
- B. Storage and Protection: Store materials inside if possible, away from sparks and open flame. Store in a secure area to avoid tampering and contamination. Water based materials must be kept from freezing. Store and handle in accordance with manufacturer's written instructions.

1.06 PROJECT CONDITIONS

- A. Surface Preparation: Surface must be free of cracks, dirt, oils, paint or other contaminants with may affect the appearance of performance of the water repellent material.
- B. Environmental Requirements:
 - 1. Air and substrate temperature must be above 40 degrees F (5 degrees C) or below 95 degrees F (35 degrees C) unless otherwise specified by manufacturer.
 - 2. Do not proceed with application if the substrate is wet or contains frozen water.
 - 3. Do not apply material when rain is predicted with 48 hours; or earlier than five (5) days after the substrate became wet.
 - 4. Do not apply materials in high or gusty winds.
- C. Protection:
 - 1. Special precautions should be taken to avoid vapor transmission (fumes) form entering building being treated. Ventilation systems and fresh air intakes should be turned off and dosed.
 - 2. Protect shrubs, metal, wood trim, glass asphalt and other building hardware during application for over spray.
 - 3. Do not permit spray mist or liquid to drift onto surrounding properties.

1.07 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the SFSD of other rights the SFSD may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Product Warranty: Submit a written warranty, for SFSDs acceptance, executed by the manufacturer and contractor agreeing to repair and replace faulty material or workmanship within the specified warranty period.
- C. Warranty Period: Five (5) year from Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Clear water repellent products specified within this section are by:
 - 1. TNEMEC/Chemprobe Coating System, LP.
2805 Industrial Lane, Garland, TX 75041
1-800-760-6776, www.chemprobe.com
Distributed by TNEMEC North West, Seattle WA
- B. Subject to compliance with requirements, equivalent products by other manufacturers are acceptable.

2.02 WATER REPELLENT

- A. Prime A Pell 200: Clear, film-less penetrating water repellent, solvent-based siloxane.
 - 1. General: All products shall contain a defused quartz carbide and modified oligomeric Siloxane. No fillers, sterates or paraffins are allowed. Products containing Siloxane, shall have a range of at least seven (7) percent solids. .

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify the following:
 - 1. The required joints sealants have been installed.
 - 2. New concrete, masonry and mortar has cured a minimum of twenty eight (28) days.
 - 3. Surfaces to be treated are clean, dry and contains no frozen water.
 - 4. Environmental conditions are appropriate for application.

3.02 PREPARATION

- A. Clean substrate of substances that might interfere with penetration or performance of water repellents. Remove all dust, dirt, bitumen, efflorescence, mortar, grout, oil, pollution deposits, and curing, forming and parting compounds, other contaminants prior to application.
- B. Use abrasive brush blast or high pressure water as necessary to achieve the required surface conditions.
- C. Allow power washer surfaces to dry three days prior to coating. Surfaces shall be dry to touch and show no visible signs of moisture prior to application of water repellent.
- D. Protect adjoining work, including sealant bond surfaces, from spillage or over spray of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Also protect asphaltic and painted surfaces and vegetation.
- E. Coordinate with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water repellent treatment have been installed and cured.
- F. Water repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent and sealant materials identical to those used in the work. In this case, submit letters from repellent and sealant manufactures verifying compatibility.
- G. All exterior (and interior if specified in room finish schedule) vertical concrete and cmu surfaces (above-grade exposed and concealed surfaces) shall receive application of repellent as per manufactures instructions.
- H. All cmu and mortar work shall be reviewed and approved by the Architect prior to repellent application. If repair work is performed after application of repellent the entire wall plain surface of wall (corner to corner or change in wall direction) shall be recoated after preparations specified above is completed.
- I. New concrete and mortar must be allowed to cure a minimum of twenty-eight (28) days for treatment.

3.03 APPLICATION

- A. Apply water repellents in accordance with manufacturer's written application instructions.
- B. Material must be applied using low-pressure application equipment designed for water repellent application. Do not use paint spray equipment to install product.
- C. Apply material as shipped by the manufacturer. Do not dilute.

- D. Apply treatment evenly until surface is totally saturated. Coverage rates are dependent on substrate materials. Only one saturation coat is required.

3.04 FIELD QUALITY CONTROL

- A. The Architect or the Architect's representative shall inspect the progress as the work proceeds. Do not apply any water repellent that is not specified or approved by the Architect.
- B. After water repellent has cured for 24 hours at low humidity and temperature between 70-90 degrees F or 48 hours at high humidity and high temperature between 50-69 degrees F, all surfaces shall be tested with a water spray. Recoat any area that indicates water absorption.

3.05 CLEANING

- A. Protective Covering: Remove protective coverings from adjacent surfaces and other protective areas.
- B. Immediately clean water repellent from adjoining surfaces soiled or damaged by water repellent application as work progresses. Repair damage caused by water repellent application. Comply with manufacturers written cleaning instructions.
- C. At completion, remove from the job site, all excess material, debris, and waste resulting from this work. Dispose of water repellent containers according to state and local environmental regulations.

END OF SECTION

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**SECTION 07210
BUILDING INSULATION**

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. This Section includes the following:
 - 1. Foundation insulation.
 - 2. Attic insulation.
 - 3. Vapor retarder (under plywood ceilings).

1.2 RELATED WORK

- A. Division 6 – Wood Framing, Trusses and Sheathing
- B. Section 07214 – Foamed-in-Place Masonry Wall Insulation
- C. Section 07400 – Metal Roof and Soffit Panels

1.3 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Product Data for each type of insulation product and accessories specified.
- C. Informational Data:
 - 1. Test Reports: from and based on tests performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, water absorption, and other properties, base on comprehensive testing of current products.

1.4 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. E 84 Test Method for Surface Burning Characteristics of Building Materials.
 - 2. E 96 Test Method for Water Vapor Transmission of Materials.
 - 3. E 119 Test Methods for Fire Tests of Building Construction and Materials.
 - 3. E 136 Test Method for Behavior of Materials in a vertical Tube Furnace at 750 degrees C.
 - 4. C 177 Test Method for Steady-State Thermal Transmission Properties by means of the Guarded Hot Plate.

5. C 423 Test Method for Sound Absorption and the Sound Absorption Coefficient by the Reverberation Room Method.
6. C 518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter.
7. C 1289 Standard Specification for faced rigid cellular polyisocyanurate thermal insulation board, Type I, Class 2.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Submit in accordance with Section 01600.
- B. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturers written instructions for handling, storing and protecting during installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements within this section, manufacturers offering insulation products that may be incorporated in the work include, but are not limited to, the following:
 1. Dow Chemical Company
 2. Owens Corning
 3. Johns Manville

2.2 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
 1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thickness, widths, and lengths.
- B. Extruded Polystyrene (XPS) Insulation:
 1. Underslab/Foundation Insulation
 - a. Thermal Resistance per inch (ASTM C518): R5.0
 - b. Compressive Strength (ASTM D1621): 25
 - c. Water Absorption (ASTM C272): 0.3
 - d. Water Vapor Permeance (ASTM E96): 1.5
 - e. Maximum Use Temperature (F): 165
 - f. Flexural Strength (ASTM C203)(psi): 50
 - g. Edge: Tongue and Groove
 - h. Thickness:

- i. Perimeter of Foundation: 2 inches unless indicated otherwise.
- C. Loose-Fill, Blown-In Insulation: Fiberglass blowing insulation for attic.
 - 1. Owens Corning, Propink L77 Pink, Fiberglass Insulation or equal
 - 2. Thermal Resistance: R-38, Minimum Insulation thickness: 12.75" or greater to meet manufactures R-38 requirement. See Sheet A-001, Thermal Envelope Vales for this Project
 - 3. Number of bags per 1,000 sq ft of net area: 22+ bags
 - 4. Fire Hazard Classification: ASTM E 84.
 - a. Maximum Flame Spread Index: 5.
 - b. Maximum Smoke Developed Index: 50 or less.
 - 5. Combustion Characteristics (ASTM E 136): Pass.
 - 6. Critical Radian Flux (ASTM E970): Pass
 - 7. Water Vapor Sorption (ASTM C1104): 5% or less.
 - 8. Odor Emission (ASTM C1304): Pass.
 - 9. Corrosiveness (ASTM C665, 13.8): Pass.
 - 10. Fungi Resistance (ASTM C1338): Pass.
 - 11. Formaldehyde Free

2.3 VAPOR RETARDER

- A. Sheet Retarder: Certainteed MemBrain or equal. Polyimide film vapor retarder. Material has a permeance of 1 perm or less when tested to ASTM E 86, dry cup method and increases to greater than 10 perms using the wet cup method.
 - 1. Water Vapor Permeance:
 - a. ASTM E 86, dry cup method: 1.0 perms (57ng/Pa*s*m2).
 - b. ASTM E 86, wet cup method: 10.0 perms (1144ng/Pa*s*m2).
 - 2. Fire Hazard Classification: ASTM E 84:
 - a. Maximum Flame Spread Index; 20.
 - b. Maximum Smoke Developed Index; 55.
 - 3. Overlap seams minimum of 6"
 - 4. Seal all seams with manufactures recommended joint seal tape.
 - 5. Locations: All ceilings.

2.4 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrate indicated without damaging insulation and substrate.
- B. Insulation Fasteners: As required for each application and as recommended by manufacturer for each specific installation.
- C. Vapor Retarder Tape and Tack Tape: As recommended by vapor retarder manufacture. Low Permeance rating (0.03 perms or less).
- D. Attic Rafter Baffle: "AccuVent" or "Raft-R-Mate" attic ventilation as manufactured by Berger Quality Building Products or approved equal. Cardboard baffles are not allowed.

1. Install between all rafters around building perimeter to provide cross ventilation between insulated attic spaces and vented eaves.
 2. Polystyrene construction with ventilation channel and bendable accordion hinge zone. See eave details in drawings.
- E. Sill Plate Gasket: "FoamSealR" as manufactured by Owens Corning or approved equal. See details for width requirement.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with installer present, for compliance with requirements of Section in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.

3.3 GENERAL INSTALLATION

- A. Install in accordance with manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.
- C. Extend insulation in thickness indicated to envelope entire area to be installed. Cut and fit tightly around obstruction and fill voids with insulation. Remove projections that interfere with placement.
- D. Apply single layer of insulation to produce thickness indicated.

3.4 INSTALLATION OF PERIMETER/FOUNDATION AND UNDER-SLAB INSULATION

- A. On vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
- B. Protect top surface of horizontal insulation from damage during concrete work.
- C. If dampproofing is used as adhesive or against foundations insulation, verify dampproofing is compatible (water based emulsion) with rigid foundation insulation.

3.5 INSTALLATION OF LOOSE-FILL INSULATION

A. Attic Spaces:

1. Prior to insulation installation, insulation depth markers must be installed in the attic. Depth markers must be installed for every three hundred square feet of attic area and must face toward the attic access.
2. Apply according to ASTM C 1015 and manufactures written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
3. See Paragraph 2.2.C above for coverage rates.

3.6 INSTALLATION OF VAPOR RETARDERS

- A. General: Extend vapor retarder to extremities of areas to be protected for vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal joints in vapor retarders over framing by lapping not less than 2 wall studs. Fasten vapor retarders to framing at all framing, at perimeter of ceiling openings and at lap joints. Space fasteners 16 inches o.c.
- C. Seal overlapping joints in vapor retarders with adhesive or vapor-retarder tape according to vapor retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrate.
- D. Firmly attach vapor retarders to substrate with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.
- E. Seal joints caused by pipes, conduits, electrical boxes and similar items penetrating vapor retarders with vapor-retarder tape or another layer of vapor retarder.
- F. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder

3.7 PROTECTION

- A. General: Protect installed insulation and vapor retarders from damage due to harmful weather exposure, physical abuse and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 07210 – 5

BUILDING INSULATION

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SECTION 07214
FOAMED-IN-PLACE MASONRY WALL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Extent of insulation work is shown on drawings and indicated by provisions of this section.
- B. Applications of insulation specified in this section include the following:
 - 1. Foamed-In-Place masonry insulation for thermal and/or sound values.

1.2 SUBMITTALS

- A. Product and technical presentation as provided by the manufacturer.
- B. Certified Test Reports: With product data, submit copies of certified test reports showing compliance with specified performance values, including R-values, fire performance and sound abatement characteristics.
- C. Material Safety Data Sheet: Submit Material Safety Data Sheet complying with OSHA Hazard Communication Standard, 29 CFR 1910 1200.

1.3 QUALITY ASSURANCE

- A. Manufacturing Standards: Provide insulation produced by a single and approved manufacturer. The product must come from the manufacturer pre-mixed to ensure consistency.
- B. Installer Qualifications for Foamed-In-Place Masonry Insulation: Engage an experienced dealer/applicator who has been trained and licensed by the product manufacturer and which has not less than three years direct experience in the installation of the product used.
- C. Warranty: Upon request, a one year product and installation warranty will be issued by both the manufacturer and installer.
- D. Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by a testing agency acceptable to authorities having jurisdiction.

Product must be classified by Underwriters Laboratory® ("UL") as to Surface Burning Characteristics

Fire Resistance Ratings:	ASTM E-119
Surface Burning Characteristics:	ASTM E-84
Combustion Characteristics:	ASTM E-136

PART 2 – PRODUCTS

1.4 ACCEPTABLE MANUFACTURERS

- A. Manufacturers of Foamed-In-Place Masonry Insulation: Subject to compliance with requirements, provide products from the following:
 - 1. **"Core-Fill 500™"** Tailored Chemical Products,
 - ii. P.O. Drawer 4186
 - iii. Hickory, N.C. 28603
 - iv. (800) 627-1687.
 - 2. Subject to compliance with requirements within this section, equivalent products by the following manufacturers are acceptable.
 - 1. R501, manufactured by; Polymaster
 - 2. Core Foam, manufactured by; CFI Foam, Inc.

1.5 INSULATING MATERIALS

- A. General: Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.
- B. Foamed-In-Place Masonry Insulation: Two component thermal insulation produced by combining a plastic resin and catalyst foaming agent surfactant which, when properly ratioed and mixed, together with compressed air produce a cold-setting foam insulation in the hollow cores of hollow unit masonry walls.
 - 1. Fire-Resistance Ratings: Minimum four (4) hour fire resistance wall rating (ASTM E-119) for 8" and 12" concrete masonry units when used in standard two (2) hour rated CMUs.
 - 2. Surface Burning Characteristics: Maximum flame spread, smoke developed at 4 inch thickness meets Class 1 or Class A classification.
 - 3. Thermal Values: "R" Value of 4.63/inch @ 25 degrees F mean; ASTM C-518.
 - 4. Sound Abatement: Minimum Sound Transmission Class ("STC") rating of 52 and a minimum Outdoor Indoor Transmission Class ("OITC") rating of 44 for 3.5" wall assembly (ASTM E 90).
 - 5. Maximum thermal conductivity of 0.44 Btu-in/h•ft²•°F. As per 2009 Washington State Energy Code (WSEC), Table 13.1, Footnote 1.

PART 3 – EXECUTION

1.6 INSPECTION AND PREPARATION

- A. Application Assemblies:
 - Block Walls: 8" concrete masonry units
 - Cavity Walls: 2" cavity or greater

1.7 INSTALLATION OF FOAMED-IN-PLACE INSULATION

- A. General: Install foamed-in-place insulation from interior, or as specified, prior to installation of interior finish work (prior to painting) and after all masonry and structural concrete work is in place; comply with manufacturer's instructions.
 - a. Drilling and patching inject holes must be done prior to painting of all walls and ceiling. Drilling, grouting holes and touchup painting after the final painting is complete will not be allowed!
- B. Installation: Fill all open cells and voids in hollow concrete masonry walls where shown on drawings. The foam insulation shall be pressure injected through a series of 5/8" to 7/8" holes drilled into every vertical column of block cells (every 8" on center) beginning at an approximate height of four (4) feet from finished floor level. Repeat this procedure at an approximate height of ten (10) feet above the first horizontal row of holes (or as needed) until the void is completely filled. Patch holes with mortar and score to resemble existing surface.

END OF SECTION

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**SECTION 07275
WEATHER BARRIER**

PART 1 - GENERAL

1.01 SUMMARY

- A. Includes but not limited to:
 - A. Furnish and install weather resistive barriers with integral water-resistive and air barrier on exterior side of framed exterior walls as described in Contract Documents.

1.02 RELATED WORK

- A. Section 06100 – Rough Carpentry
- B. Section 07411 – Metal Wall Panels

1.03 REFERENCES

- A. ASTM D 903 – Standard Test Method for Peel and Stripping Strength of adhesive bonds.
- B. ASTM D 1970 – Standard Specification for Self-Adhesion Polymer Modified Bituminous Sheet Materials.
- C. ASTM D 2533 – Standard Practice for Twisting Load-Strain Properties.
- D. ASTM E 96 – Standard Test Method for Water Transmission of Materials.
- E. ASTM E 1677 – Standard Specification for an Air Retarder Material or System for Low-Rise Framed Building Walls.
- F. AATCC-127 – Hydrostatic Head Test.
- G. ASTM D 5733 – Trapezoidal Test.
- H. ASTM D 779 – Dry Indicator Method, Water Penetration Resistance.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Product Data: For weather barrier and seam tape:
 - 1. Submit copies of test results showing performance characteristics equaling or exceeding those specified.

2. If caulk or sealants will be in contact with self-adhered flashing, submit list of tested and approved caulks and sealants that are chemically compatible and proposed to be used with self-adhered flashing systems.
- C. Product Sample:
 1. Weather Barrier: Min of 8" x 8"
 2. Self-Adhered Tape(s)
- D. Manufacturer Instructions: Provide manufacturer's written installation instructions.
- E. Weather Barrier Warranty.

1.05 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the SFSD of other rights the SFSD may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Manufacturer's Warranty:
 1. Weather Barrier: Lifetime product replacement and system warranty.
 2. Flashing: 10-year

PART 2 - PRODUCTS

2.01 WEATHER BARRIER

- A. Basis of Design Product:
 1. TYPAR Weather-Protection Membrane by Fiberweb Inc., A Berry Plastics Company.
- B. Subject to compliance with requirements within this section, equivalent products by the following manufacturers are acceptable.
 1. CertainTeed Weather-Protection Membrane by CertainTeed.
 2. Approved equal.
- C. Weather-Barrier
 1. Spunbonded Polypropylene Weather Membrane with a microporous coating. Non-woven, Nonperforated.
 2. Performance Characteristics:
 - a. Gurley Hill (TAPPI T-460) (sec/100cc): >2500
 - b. Water Vapor Transmission 9-15 perms as tested by ASTM E 90, Method A.
 - c. Water penetration resistance of 865 cm on hydrostatic head in accordance with AATCC-127.
 - d. Trapezoidal Test of 30/33 in accordance with ASTM D 5733-9.
 - e. Air-Ins < .02L/S-M2 @ 75 PA.

- f. Dry Indicator Method ASTM D 779 = to 24 hour rating.

2.02 SEALING TAPE/FASTENERS

- A. Seam Tape: Pressure-sensitive, self-adhering, cold applied seam tape approved by weather-barrier manufacture.
- B. Sealants against logo side coating: Elastomeric polymer based, butyl rubber, rubber bases meeting ASTM C 920 evaluation.
- C. Recommended fasteners for wood and wood sheathing.
 - 1. Plastic cap nails
 - 2. Plastic cap staples

2.03 SELF-ADHERING FLASHING

- A. Self-Adhering/Straight Flashing
 - 1. Face material composition: smooth polypropylene barrier.
 - 2. Adhesive Composition: Butyl adhesive.
 - 3. Thickness: 15mil.
 - 4. Release Liner: Siliconized paper.
 - 5. Dimensions: 6" or 9" as recommended by manufacture and as needed to properly seal locations.
 - 6. Performance Characterizations:
 - a. Low Temp Flex (ASTM D 903): Pass
 - b. Nail Sealability (ASTM D 1970): Pass
 - c. Tensile Strength (ASTM D 2523): Pass
 - 7. Accessories:
 - a. Primer: Use 3M Supper 77 or equal.
 - b. Seam Tape: TYPAR construction
 - c. Fastener: Fastener is dependent on substrate construction.
 - d. Sealant: Must comply with ASTM C 920 elastomeric polymer sealant.
- B. Self-Adhering/Flexible Flashing
 - 1. Face material composition: Conformable textured polyolefin.
 - 2. Adhesive Composition: Butyl adhesive.
 - 3. Thickness: 60mil.
 - 4. Release Liner: Siliconized paper.
 - 5. Dimensions: 6" or 9" as recommended by manufacture and as needed to properly seal locations.
 - 6. Performance Characterizations:
 - a. Low Temp Flex (ASTM D 903): Pass
 - b. Nail Sealability (ASTM D 1970): Pass
 - c. Tensile Strength (ASTM D 2523): Pass
 - 7. Accessories:
 - a. Primer: Use 3M Supper 77 or equal.
 - b. Seam Tape: TYPAR construction
 - c. Fastener: Fastener is dependent on substrate construction.
 - d. Sealant: Must comply with ASTM C 920 elastomeric polymer sealant.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances and method of attachment with other work.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions over substrate type.
- B. Seal joints and penetrations through weather resistive barrier with specified tap and fasteners prior to installation of finish material. Air infiltration barrier shall be air tight and free from holes, tears, and punctures. All window and door penetrations are to be flashed and sealed per ASTM 2112, AMMA guidelines and manufacturer instructions.
- C. Install weather barrier prior to the installation of flashing.
- D. Many common used sealants and caulks (polyurethane and silicone) contain solvents and plasticizers with can react with the rubberized asphalt adhesive on flashing systems. Verify caulks or sealants coming in contact with adhesive portion of flashing do not contain plasticizers or solvents.

3.03 PROTECTION, ADJUSTING AND CLEANING

- A. At completion of each day's work and at work remove construction debris from project site and legally dispose of debris.

END OF SECTION

SECTION 07400
METAL ROOF AND SOFFIT PANELS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Work includes, but is not necessarily limited to, furnishing all labor, materials and equipment for the installation of manufactured metal roof and soffit panels as shown on the drawings.
- B. Work is to include all flashing, trim, and other materials to produce a finished product.
- C. All framing members on the underside of the roof overhang are to be covered with soffit panels. No framing members are to be visible.

1.02 RELATED WORK

- A. Section 07210 – Building Insulation
- B. Section 07412 – Metal Wall Panels
- C. Section 07620 – Sheet Metal Flashing and Trim
- D. Section 07920 – Joint Sealants

1.03 REFERENCES

- A. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM A 1011 – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low Alloy with Improved Formability, and Ultra-High Strength.
- C. ASTM D 2244 – Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
- D. ASTM D 4214 – Standard Test Methods for Evaluation the Degree of Chalking of Exterior Paint Films.
- E. ASTM E 119 – Standard Test methods for Fire Test of Building Construction and Materials.
- F. ASTM E 1646 – Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air pressure Difference.
- G. ASTM E 1680 – Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems.
- H. ASTM E 2140 – Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
- I. UL 263 – Fire Tests of Building construction and Materials.
- J. UL 580 – Tests for Uplift Resistance of Roof Assemblies.
- K. UL 790 – Standard Test Methods for Fire Tests of Roofing Coverings.
- L. UL 2218 – Impact Resistance of Prepared Roof Covering Materials.

SECTION 07400 – 1 METAL ROOF & SOFFIT PANELS

- M. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
Architectural Sheet Metal Manual.

1.04 PERFORMANCE REQUIREMENTS

A. Base Metal

1. Roof Panels: are to be formed from steel conforming to:
 - a. ASTM A924/A792 Zinalume/Galvalume, minimum yield 50,000 psi
2. Soffit Panels: are to be formed from steel conforming to:
 - a. Yield strength 50,000 psi, with aluminum-zinc alloy coating conforming to ASTM A792, Class AZ50.

B. Testing and Certification

1. Wind Uplift Performance: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7.
 - a. Design Loads: See Drawing Sheet S-001 & S-002 – General Structural Notes for the following project specific Wind Loading Requirements.
 - I. Basic Wind Speed (3-second gust).
 - II. Wind Exposure.
 - III. Wind Importance Factor, I_w .
 - IV. Enclosure Classification.
2. Structural Performance: The wind uplift resistance of the roof assembly shall be established in accordance with ASTM E 1592.
3. Air Infiltration: Panel (without insulation) to meet the following standard when tested in accordance with ASTM E 1680-95.
 - a. With Sidelap Sealant - 0.006 CFM/lineal ft. of panel seam at 1.57 psf, positive and
 - b. 0.02 CFM/lineal ft. of panel seam at 1.57 psf negative pressure.
4. Water Penetration: Panel to meet the following standard when tested in accordance with ASTM E1646-95.
 - a. With Sidelap Sealant – no leakage at 6.24 psf.

C. Finish

1. Interior Finish Primer Coat Material: Corrosion-resistant primer; primer coat dry film thickness: 0.35 mils, off-white to light gray in color.

2. Exterior Finish Coat Material: baked-on 0.15 – 0.20 mil corrosion resistant primer and factory-applied baked-on paint system 0.70 – 0.80 mil on exterior side using polyvinylidene fluoride (PVF₂), such as "Kynar 500" or equal, meeting the following requirements.
 - a. Weathering: No checking, blistering or adhesion loss when tested for 5000 hours in accordance with ASTM G-23-69.
 - b. Chalking: Will not chalk greater than #8 rating when tested for 2000 hours in accordance with ASTM D-659.
 - c. Fading: Color changed will not exceed 5 NBS units when tested for 5000 hours in accordance with ASTM D-2244.
 - d. Humidity: Shall be less than 5% of #8 blister when tested for 5000 hours in 100% humidity at 100 degrees F in accordance with ASTM D-2247.
 - e. Flexibility: No rupture of coating when subjected to a 180 degree bend around a 1/8" mandrel in accordance with ASTM D-1737.
 - f. Formability: When subjected to a 180 degree bend over 1/8" diameter mandrel in accordance with ASTM D-1737, exterior coating shall be flexible to the point of metal rupture without separation of coating from substrate.
 - g. Abrasion Resistance: Coating system shall withstand a minimum of 65 liters of falling sand before appearance of base metal per ASTM D-968.

1.05 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Product Data: For the following:
 1. Submit manufacturer's technical product data, installation instructions and recommendations for each type of roofing and soffit requirements. Include highlighted data substantiating that materials comply with requirements.
- C. Shop Drawings: Submit complete shop drawings detailing:
 1. Roof Panels:
 - a. Showing methods of installation, plans, sections, elevations and details of roof panels, specified loads, flashing, roof curbs, vents, sealants, interfaces with all materials not supplied by the metal panel system manufacturer, and identification of proposed component parts and their finishes.
 2. Soffit Panels:
 - a. All perimeter and joint flashings that comply with manufacturer's standard recommendations.
 - b. Describe all proposed details that deviate from what is shown on the drawings.
 - c. Details to allow for expansion and contraction.

- D. Samples:
1. Prior to ordering products, submit manufacturer's standard color samples for Architect's selection.
 2. Prior to starting work, submit the following:
 - a. Roof Panels: (2) 12-inch long panel samples showing shape and the representative color as approved by the Architect.
 - b. Soffit Panels: (2) 12-inch x 12-inch panel samples showing shape and the representative color as approved by the Architect.
- E. Informational Data:
1. Test Reports: Specifying that all products comply with performance requirements specified within this section.
 2. Certifications specified in the following Quality Assurance article.
 3. Qualification Data: Manufacturer's, engineer's and installer's qualification data.
 4. Manufacturer's instructions.
- F. Engineering Calculations: The roof panel manufacturer shall submit a detailed, project specific, engineering report prepared by a licensed engineer. The report shall include, but not limited to, the following:
1. Project name and location.
 2. Design codes used in engineering report.
 3. Panel attachment summary with project specific structural values provided in the Structural General Notes found in the construction documents and pertinent codes.
 4. Design Criteria
 5. Roof Information.
 6. Design Loads.
 7. Fastener Pullout Capacity
 8. Drag Calculations
 9. Considerations for loads due to specified snow stops in locations as indicated in the construction documents.
 10. Show that panels, clips and fastener comply with IBC wind uplift requirements.
- G. Closeout Data:
1. Maintenance Data:
 2. Warranty: Submit specified warranty.

1.06 QUALITY ASSURANCE

- A. Single-Source: Obtain roof, soffit and wall panels from one manufacturer.
- B. Installers Qualifications: Installer shall have a minimum of 5 years' experience to perform work and is acceptable to panel manufacturer.
- C. Manufacture Qualifications:

1. Manufacturer shall have a minimum of 10 years experience supplying metal roof and soffit panels to the region where the work is to be done.
 2. Capable of providing field service representation during construction, approving acceptable installer and approving application methods.
- D. Regulatory Agency Requirements: Comply with IBC and local Building Code requirements if more than those specified.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with manufacturer's current printed product storage recommendations.
- B. Protect against damage and discoloration.
- C. Handle panels with non-marring slings.
- D. Do not bend panels.
- E. Protect panels against standing water and condensation between adjacent surfaces.
- F. If panels become wet, immediately separate sheets, wipe dry and allow to air dry.
- G. Remove and strippable film prior to installation and do not allow to remain on panels in extreme cold, heat or in direct sunlight.

1.08 PROJECT CONDITIONS

- A. Examine the conditions and substrate in which metal roof and wall panels are to be installed. Substrate shall be installed level, flat and true to avoid panel stresses.
- B. Field measurements shall be taken prior to fabrication of panels.
- C. Proceed with panel installation only after satisfactory conditions are met.

1.09 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the owner of other rights the owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Manufacturer's Product Warranty: Submit a written warranty, for owner acceptance, executed by the manufacturer agreeing to cover failure of the factory-applied exterior finish on metal roof and wall panels within the warranty period
 1. Exposure Panel Finish: The paint on the product will not:
 - a. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

- b. Chalk or oxidation in excess of No. 8 when tested according to ASTM D 4214
 - c. Fade or change color, in excess of five (5) DE (Hunter) units when tested according to ASTM D 2244.
- 2. Finish Warranty Period: 35 years from Date of Substantial Completion.
- C. Special Weathertightness Warranty for Roof System: Manufacturer's standard full system warranty that covers the weathertight integrity of the roof panels and all flashings.
 - 1. Weathertight Warranty Period: 5 years for date of Substantial Completion.
- D. Contractors Warranty: Warrant panels, flashing, sealant, fasteners, and accessories against defective materials and/or workmanship, to remain watertight and weatherproof with normal usage for two (2) years following project substantial completion date, and to repair or replace without additional cost to the Owner, any leaks, and resulting damage to other materials and building contents as may occur.

PART 2 - PRODUCTS

2.01 METAL ROOF PANEL

- A. Basis of Design Product:
 - 1. Metal Sales Manufacturing Corporation, Vertical Seam.
- B. Subject to compliance with requirements within this section, equivalent (matching) products and colors by the following manufacturers are acceptable.
 - 1. AEP Span – Design Span HP
 - 2. Firestone
 - 3. Taylor Metal Products
- C. Roof Panel
 - 1. Width: 16-inch net coverage.
 - 2. Thickness: 24 gauge (0.0296 inch) minimum.
 - 3. Rib Height: 1-3/4 inches.
 - 4. Profile: Flat Pan.
 - 5. Minimum Roof Slope Capability: 1:12 over solid substrate.
 - 6. Sealant: Factory-applied side lap sealant.
 - 7. Side Lap: Snap seamed.
 - 8. Attachment: Concealed clip designed for thermal movement.
 - 9. Finish: PVDF – Kynar 500 or Hylar 5000.
 - 10. Color: Metal Sales - Medium Bronze:
 - 11. Fire Resistance Rating: Comply with UL 263 and UL 790 Class A Fire Resistance Ratings.
 - 12. Air Infiltration: Tested according to ASTM E 1680.
 - 13. Water Infiltration: No leakage when tested according to ASTM E 1646.

14. Wind Uplift Resistance: Tested according to ASTM E 1592 and in compliance with UL 580, Class 90 Wind Uplift, Construction #254, 255, 261, 303, 342, 343, 364, 436, 445, 446, 447, 448, 508 and 508A.

2.02 METAL SOFFIT PANELS

- A. Basis of Design Product:
 1. Metal Sales Manufacturing Corporation, Soffit Panel.
- B. Soffit Panel
 1. Profile: 12-inches wide with (2) pencil ribs (V groove) evenly spaced.
 2. 1 inch high.
 3. Thickness: 24 gauge minimum, Max Length 12'.
 4. Solid, non-perforated.
 5. Perforation: Perforated (lanced) for ventilation,
 - a. Holes spaced 7/8" inches o.c. (longitudinal) and 1/4" inches o.c. (transverse), Holes 1/8" x 1/2".
 - b. See Construction Drawings for specific location of perforated soffit panels.
 6. Attachment: Concealed, direct fastened panel.
 7. Installation Direction: Perpendicular to fascia and walls.
 8. Profile: Tongue-and-groove sidelap.
 9. Finish: PVDF – Kynar 500 or Hylar 5000.
 10. Color: See Manufacturer's Product and Color Schedule on Drawing Sheet A-901

2.03 SELF-ADHERED RUBBERIZED WATERPROOFING MEMBRANE

- A. High-tensile-strength rubberized asphalt underlayment. WIP 300HT manufactured by Carlisle WIP Products or equal. To be installed over the entire surface of roof sheathing. Underlayment and roof panel system shall be approved by roof manufacturer to provide special weathertightness warranty as specified.
 1. Thickness (ASTM D1970): 40 mils.
 2. Low Temperature Flexibility (ASTM D1970): -45°F.
 3. Adhesion to Plywood at 75°F (ASTM D1970): 35 lbs/ft.
 4. Salability Around Nails (ASTM D1970): Pass.
 5. Slip Resistance (ASTM D1970): Pass.
 6. Moisture Vapor Permeance (ASTM D1970): 0.02 perms.
 7. Water Absorption (ASTM D1970): 0.5%.
 8. Tensile Strength Machine Direction (ASTM D412): 250 psi.
 9. Tensile Strength Transverse Direction (ASTM D412): 1,390 psi.
 10. Elongation at Break Machine Direction (ASTM D412): 250%.
 11. Elongation at Break Transverse Direction (ASTM D412): 170%.
 12. Membrane: Rubberized Asphalt.
 13. Material Warranty: Minimum ten (10) years.
 14. Exposed rubberized membrane will not be allowed. See Article 2.04 below.

2.04 SLIP SHEET:

- A. Required only if self-adhered rubberized waterproofing membrane does not have integral top covering that acts as slip sheet. Exposed rubberized membrane on top will not be allowed.
- B. Basis of Design Product:
 - 1. Johns Manville, Polyester Mat Protection Slipsheet.
- C. Slip Sheet
 - 1. Location: Between self-adhered rubberized waterproofing membrane and standing seam metal roof. To protect the underlayment from damage, as the roof panels can adhere to and tear the underlayment.
 - 2. Needle-punched, polyester mat.
 - 3. UV-resistant.
 - 4. 12 feet wide.

2.05 ACCESSORIES

- A. Roof Panel Accessories:
 - 1. Accessories: Except as indicated as work of another specification section, provide components required for a complete roof and wall panel system, including, but is not necessarily limited to, fascias, ridge closures and vents, clips, seam covers, flashing, sealants, gaskets, fillers, closure strips and similar items. Match materials and finishes of panels.
 - a. Fastener Clip: 21 gauge steel clip coated with Zinalume, UL-90 rated. For direct application over rigid insulation installed over metal decking.
 - b. Closure strips: Closed-cell, self-extinguishing, expanded cellular rubber or cross-linked polyethylene foam flexible closure strips. Premolded to match configuration of roof and wall panels. Provide closure strips where indicated or necessary to ensure weathertight construction and discourages insects and small birds from nesting.
 - c. Sealing Tape: Pressure-sensitive 100 percent solids polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
 - d. Joint Sealant: One-part elastomeric urethane sealant or as recommended by panel manufacturer.
 - e. Bituminous Coating: Cold-applied asphalt mastic, SSPC paint 12, compounded for 15 mil dry film thickness per coat.
 - 2. Pipe Boot Base Flashing:
 - a. Commercial, one piece EPDM pipe base flashing.
 - b. Corrosion-resistant base made of heavy duty aluminum alloy.
 - c. Matches roof pitch.
 - d. Install with stainless steel fasteners.
 - e. Color: To match adjacent metal roof color.
 - f. Install per metal roof and base flashing manufacturer written instructions. The most stringent installation instructions shall be used.
 - g. See Section 07721 – Roof Vent Pipe Protectors.

B. Soffit Panel Accessories:

1. Panel Penetration Flashing: Recommended by panel manufacturer.
2. Flashings: Match panel finishes and material. Do not use lead or copper.
3. Fasteners: Per manufacturer recommendations.
 - a. Conceal whenever possible, if exposed use same color of parts they attach.
4. Furring Channel: Aluminum or galvanized steel.
5. Profile Closures: Use neoprene or polyethylene foam, die-cut or formed to panel configuration.
6. Fabrication: Unless otherwise shown on drawings or specified herein, fabricate panels in continuous one-piece lengths and fabricated flashings and accessories in longest practical lengths.

C. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating. See Section 07620 –Sheet Metal Flashing and Trim.

2.07 GUTTERS AND DOWNSPOUTS

A. See Section 07711 – Gutters and Downspouts.

2.08 FABRICATION

- A. Fabricate and finish metal roof panels and soffit accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. End Seams for Other Than Aluminum: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

5. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions.
- B. Verify dimensions, tolerances and method of attachment with other work.
- C. Verify that installation may be made in accordance with approved shop drawings and manufacturer's instructions. If field measurements differ from contract drawings or shop drawings notify Architect prior to fabrication.
- D. Prior to starting work, notify general contractor about defects requiring correction.
- E. Do not start work until conditions are satisfactory.

3.02 INSTALLATION

- A. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Install in accordance with manufacturer's instructions.
- C. Apply bituminous coating or other permanent separation materials on panel surfaces where panels would otherwise be in contact with substrate materials that are non-compatible or could result in electrolytic corrosion or deterioration of either material or finishes. Coat back of metal roof and wall panels with bituminous coating where it will contact wood, ferrous metal or cementitious construction.
- D. Self-Adhered Rubberized Waterproofing Membrane:
 1. Do not install when air, roof deck and membrane temperatures are below 40° F.
 2. Substrate must be free of any moisture. If moisture is present, it may inhibit adhesion.
 3. Remove dust, dirt, loose material and protrusions from substrate that membrane will be applied.
 4. Clean and prime (if recommended by manufacture) based on individual substrate material.
 5. Install membrane such that all laps shed water. Work for the low point to the high point of the roof at all times. Apply the membrane in valleys before the

membrane is applied to the eaves. Following placement along eaves, continue application of the membrane up the roof.

6. Side laps minimum 3 ½ inches and end laps minimum 6 inches following lap lines marked on underlayment membrane.
7. Patch penetrations and damage using manufacturer's recommended methods.
8. Trim to or wrap under edge of substrate at continuous ridge vent. Do not allow membrane to hang over and block vent opening.

E. Roof Panels:

1. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
2. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels before installing fasteners.
 - a. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.
3. Follow roof panel manufacturer's instructions in conjunction with approved shop drawings.
4. Factory sidelap sealant to be used at all panel lap connections.
5. Install panel seams vertically.
6. Lap panels away from prevailing wind directions.
7. Secure panels without warp or deflection.
8. Maximum Alignment Variation: 1/4 inch in 40 feet.
9. Flashing and Trim:
 - a. Overlap roof panels at least 6 inches.
 - b. Install flashing to allow for thermal movement.
 - c. Remove any strippable protective film, if used, immediately preceding flashing installation.
10. Cutting and Fitting:
 - a. Neat, square and true. Torch cutting is prohibited where cut is exposed to final view.
 - b. Openings 6 inches and larger in any direction shall be shop fabricated and reinforced to maintain original load capacity.
 - c. Openings less than 6 inches in largest dimension can be made by trade requiring opening.
 - d. Where necessary to saw cut panels, debur and treat with galvanic paint.
11. Roof curbs: Install curbs at locations indicated on drawings. Install flashing around bases where they meet metal roof panels.
12. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

F. Soffit Panels

1. Provide metal soffit panels full width of soffits.
2. Install panel's perpendicular to support framing. Soffit panels to be installed perpendicular to fascia and exterior walls.

3. Follow soffit panel manufacturer's instructions in conjunction with approved shop drawings.
 2. Cutting and Fitting:
 - a. Neat, square and true. Torch cutting is prohibited where cut is exposed to final view.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
 3. See Section 07620 – Sheet Metal Flashing and Trim for additional requirements.
- H. Pipe Flashing
1. Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.03 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of ¼ inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.04 PREPARATION

- A. Clean and dry surfaces prior to applying sealants.

3.05 ADJUSTING, CLEANING AND PROTECTION

- A. Panels or flashings that have severe paint and/or substrate damage shall be replaced as directed by the Architect or SFSDs representative. Do not use touch-up paint on damaged surfaces.
- B. Remove temporary covering and protection.

- C. At completion of each day's work and at work completion, sweep panels, flashings and gutters clean. Do not allow fasteners, cuttings, fillings or scraps to accumulate. Remove construction debris from project site and legally dispose of debris.
- D. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

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SECTION 07411
METAL WALL PANELS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section includes the following:
 - 1. Work includes, but is not necessarily limited to, furnishing all labor, materials and equipment for the installation of manufactured lap-seam metal wall panels as shown on the drawings.
 - 2. Work is to include all flashing, trim, and other materials to produce a finished product.

1.02 RELATED WORK

- A. Section 07275 – Weather Barrier
- B. Section 07400 – Metal Roof and Soffit Panels
- C. Section 07620 – Sheet Metal Flashing and Trim
- D. Section 07920 – Join Sealants

1.03 PERFORMANCE REQUIREMENTS

- A. ASTM A792 – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Product Data: Submit manufacturer's technical product data, installation instructions and recommendations for each type of wall panel required. Include data substantiating the materials comply with requirements.
- C. Shop Drawings: Show panel layout, trim installation, and panel attachment and spacing requirements.
- D. Samples:
 - 1. Color Samples: Minimum (2) 12-inch long panel samples showing shape and the representative color as approved by the Architect.
- E. Informational Data:

1. Test Reports: Specifying that all products comply with performance requirements specified within this section.
 2. Certifications specified in the following Quality Assurance article.
 3. Qualification Data: Manufacturer's, engineer's and installer's qualification data.
 4. Manufacturer's instructions.
- F. Closeout Data (above items outlined above under submittals, in addition to the following): (Section 01700)
1. Maintenance Data
 2. Warranty: Submit specified warranty.

1.05 QUALITY ASSURANCE

- A. Single-Source: Obtain wall, roof and soffit panels from one manufacturer.
- B. Installers Qualifications: Installation of panels and accessories by installers with a minimum of 5 years experience on panel projects of this nature and is acceptable to panel manufacturer.
- C. Manufacture Qualifications:
1. Manufacturer shall have a minimum of 10 years experience supplying wall panels to the region where the work is to be done.
 2. Capable of providing field service representation during construction, approving acceptable installer and approving application methods.
- D. Regulatory Agency Requirements: Comply with IBC and local Building Code requirements if more than those specified.

1.06 DELIVERY, STORAGE AND HANDLING

- A. General: Submit in accordance with Section 01600.
- B. Protect against damage and discoloration.
- C. Handle panels with non-marring slings.
- D. Do not bend panels.
- E. Protect panels against standing water and condensation between adjacent surfaces.
- F. If panels become wet, immediately separate sheets, wipe dry and allow to air dry.
- G. Remove and strippable film prior to installation and do not allow to remain on panels in extreme cold, heat or in direct sunlight.

1.07 PROJECT CONDITIONS

- A. Examine the conditions and substrate in which metal wall panels are to be installed. Substrate shall be installed level, flat and true to avoid panel stresses.
- B. Field measurements shall be taken prior to fabrication of panels.
- C. Proceed with panel installation only after satisfactory conditions are met.

1.08 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Manufacturer's Product Warranty: Submit a written warranty, for Owner's acceptance, executed by the manufacturer agreeing to cover failure of the factory-applied exterior finish on wall wall panels within the warranty period.
 - 1. Exposure Panel Finish: The paint on the product will not:
 - a. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - b. Chalk or oxidation in excess of No. 8 when tested according to ASTM D 4214
 - c. Fade or change color, in excess of five (5) DE (Hunter) units when tested according to ASTM D 2244.
 - 2. Finish Warranty Period: Minimum of thirty five (35) years from Date of Substantial Completion.
- C. Contractors Warranty: Warrant panels, flashing, sealant, fasteners, and accessories against defective materials and/or workmanship, to remain watertight and weatherproof with normal usage for two (2) years following project substantial completion date, and to repair or replace without additional cost to the Owner, any leaks, and resulting damage to other materials and building contents as may occur.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Wall panel products specified within this section are by:
 - 1. Metal Sales Manufacturing Corporation.
- B. Subject to compliance with requirements and matching colors, equivalent products by the following manufacturers are acceptable.

1. Metal Building Components, Inc. (MBCI)
2. AEP Span.

2.02 PRODUCTS

- A. Basis of Design Product:
 1. Metal Sales Manufacturing Corporation, TL-1222
- B. Subject to compliance with requirements within this section, equivalent products by the following manufacturers are acceptable.
 1. Metal Building Components, Inc. (MBCI)
 2. AEP Span
 3. Approved equal.
- B. Metal Wall Panel:
 1. Width: 12 inches.
 2. Thickness: 24 gauge minimum.
 3. Panel Depth: 1 1/2 inches
 4. Color: See Manufacture's Product and Color Schedule on Drawing Sheet A-002.
 5. Attachment: Concealed direct fastener.
 6. Material: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, AZ55 coating designation, structural quality, Grade 50, 0.0236-inch minimum thickness.
 7. Panel Surface Configuration: Minor Ribs
 8. Surface Finish: PVDF (Kynar 500 or Hylar 5000)
 9. Interior Primer Coat Finish:
 - a. Corrosion-resistant primer; primer coat dry film thickness: 0.15 mils; finish coat material: Polyester paint, finish coat dry film thickness: 0.35 mils.
 - b. Color: off-white to light gray.

2.03 ACCESSORIES

- A. Flashing and Trim: Formed from same material as metal wall panels, prepainted with coil coating.
- B. Fasteners for Metal Wall Panel System: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten metal framing and wall panel to meet building codes and manufacturer's requirements.

2.04 FABRICATION

- A. Fabricate and finish metal wall panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated

performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

- B. Unless otherwise shown on drawings or specified herein, panels shall be full length. Fabricate flashings and accessories in longest practical lengths.
- C. Wall panels shall be factory formed. Field formed panels are not acceptable.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. End Seams for Other Than Aluminum: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions and proceed with work in accordance with Section 01700.
- B. Verify dimensions, tolerances and method of attachment with other work.
- C. Verify that installation may be made in accordance with approved shop drawings and manufacturer's instructions. If field measurements differ from contract drawings or shop drawings notify Architect prior to fabrication.
- D. Prior to starting work, notify general contractor about defects requiring correction.
- E. Do not start work until conditions are satisfactory.

3.02 INSTALLATION

- A. Metal Wall Panels:

1. Install components required for a complete metal wall panel assembly including trim, top, side and bottom closures, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 2. Install in accordance with manufacturer's instructions. Fasten directly to cmu wall.
 3. Apply bituminous coating or other permanent separation materials on panel surfaces where panels would otherwise be in contact with substrate materials that are non-compatible or could result in electrolytic corrosion or deterioration of either material or finishes. Coat back of metal roof and wall panels with bituminous coating where it will contact wood, ferrous metal or cementitious construction.
 4. Install flashing to allow for thermal movement.
 5. Provide metal wall panels of full length unless otherwise indicated or restricted by shipping limitations.
 6. Follow wall panel manufacturer's instructions in conjunction with approved shop drawings.
 7. Install panel seams vertically, unless noted otherwise.
 8. Lap panels away from prevailing wind directions.
 9. Cutting and Fitting:
 - a. Neat, square and true. Torch cutting is prohibited where cut is exposed to final view.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.03 PREPARATION

- A. Clean and dry surfaces prior to applying sealants.

3.04 ADJUSTING, CLEANING AND PROTECTION

SECTION 07411 – 6

METAL WALL PANELS

- A. Panels or flashings that have paint and/or substrate damage shall be replaced as directed by the Architect or Owner's representative. Do not use touch-up paint on damaged surfaces.
- B. Remove temporary protective covering.
- C. Clean installed panels in accordance with manufacturer's instructions prior to Owner's acceptance.
- D. At completion of each day's work and at work completion, wipe panels and flashings clean. Do not allow fasteners, cuttings, fillings or scraps to accumulate. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

THIS SECTION WAS LEFT BLANK INTENTIONALLY

**SECTION 07461
COMPOSITE TRIM**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Composite Trim at interior crown molding location.

1.2 RELATED WORK

- A. Division 6 – Plywood at Ceiling
- B. Section 09910 - Architectural Paints and Coatings

1.3 REFERENCES

- A. ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.
- B. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
- C. ASTM D 1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
- D. AWP A E7 - Standard Method of Evaluating Wood Preservatives by Field Tests with Stakes.
- E. AWP A E10 - Standard Method of Testing Wood Preservatives by Laboratory Soil-Block Cultures.

1.4 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Closeout Data (Section 01700):
 - 1. Maintenance Data:

2. Warranty: Submit specified warranty.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.
- B. Single-Source: Obtain siding products from one manufacturer.

1.06 DELIVERY, STORAGE AND HANDLING

- A. All materials shall be delivered in manufacturer's original packaging.
- B. Store trim on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

1.07 WARRANTY

- A. Composite Trim: 30 year material warranty.
- D. Workmanship Warranty: Application limited warranty for one (1) year.

PART 2 - PRODUCTS

2.01 PRODUCTS

- A. "MiraTEC" Treated Exterior Composite Trim (Confirmed – Still available in Spokane area)
 1. Material: Wood fibers combined with phenolic resins, zinc borate, and water repellents. No added formaldehyde.
 2. Primed 4 sides.
 3. Thickness: As specified in Construction Drawings. 4/4 if not indicated.
 4. Size: As specified in Construction Drawings.
 5. Texture: Smooth
- E. Fasteners
 1. Wood Framing: Corrosion resistant screws as recommended by manufacturer.

2.02 FINISHES

- A. Treated Composite Trim.
 1. Paint Application:
 - a. Prime and paint all exposed field-cut edges of exterior trim using a high quality exterior oil/alkyd solvent based or acrylic latex primer recommended by the manufacturer for application over composite

- wood substrates.
- b. Coat all exposed surfaces including the bottom edge. Factory finish is will not be accepted as finish coat.
- c. Finish MiraTEC Trim with two coats of paint within 90 days after installation. If the material is not painted within 90 days, reprime the trim using an exterior primer that is recommended for use on composite wood products and is compatible with the topcoat to be used. Use the same primer for repair of any damage to the original factory applied primer.
- d. A total field-applied dry film paint thickness of a minimum of 2-1/2 mils is required on MiraTEC Trim.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin until substrates have been properly prepared.
- B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION AND FINISH OF COMPOSITE TRIM

- A. Cutting
 - 1. Use a fine toothed hand saw or power saw with a combination blade.
 - 2. Cut into exposed face of the material
- B. Fastening
 - 1. Double nail a maximum of 16" O.C. for all trim applications.
 - 2. Double nail a maximum of 24" O.C. for fascia.
 - 3. Do not nail into cut edge of material.
 - 4. Nails must penetrate a minimum of 1 1/4" into framing member.
 - 5. Fasten MiraTEC from one end to the other, do not nail towards the ends from center.
- C. Butt Joints
 - 1. All joints must fall over a framing member.

2. Space all butt and scarf joints 1/8" and apply sealant into the full depth of the 1/8" joint.
3. Double nail on both sides of joint, at least 1/2" from the edge.

D. Fasteners

1. Use nails with a 3/16" head diameter, long enough to penetrate 1 1/4" into structural framing member.
2. Use nails with performance equivalent to hot dipped galvanized or better (such as 304 SS).
3. Screws, ring shank nails, etc. can be used as long as they meet the same minimum performance criteria as above.
4. Tapered or bugle head fasteners are permitted when heads are properly seal from moisture.
5. Do not countersink fasteners more than 1/8". All slightly counter sunk fasteners less than 1/8" should be filled with exterior putty and painted.

E. Flashing and Moisture Control

1. Do not apply trim to wet sheathing.
2. Do not apply trim closer than 6" to finished grade or landscaping.
3. Do not allow the trim to stand in water.
4. Do not allow direct contact with masonry or concrete. Properly flash and space a minimum of 1/2" from any concrete flatwork or horizontal brick ledge.
5. At foundations or brick veneer, the product should be separated from the masonry by metal flashing, polyethylene film, 30 lb. felt or a 1/4" to 1/2" air space using masonry standoffs.

F. Sealant

1. Do not allow water to stand on or leak behind any trim.
2. Sealant is required at butt joints and continuous at ceiling to trim joint and wall to trim joint.
3. Do not use hard-setting caulk. Rather, use exterior quality sealants that remain flexible over time.
4. Caulks and sealants that at a minimum meet ASTM C920 are recommended.
5. Install sealants prior to painting ceiling and trim.

G. Machining

1. Do not machine or route the trim in excess of 5/16" depth.
2. Maintain a minimum angle of 100 degrees from the vertical to provide positive drainage.
3. Reprime all machined areas.

END OF SECTION

SECTION 07620
SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes the following categories:

1. Metal roof and wall flashing.
2. Exposed trim
3. Exposed fascias
4. Miscellaneous metal fabrication

1.2 RELATED WORK

- A. Section 07400 - Metal Roof and Soffit Panels.
- B. Section 07411 – Metal Wall Panels.
- C. Section 07920 - Joint Sealant.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposed to weather without failing.
- B. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

1.4 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.
- D. Samples of sheet metal flashing, trim and accessory items, in the specified finish.
1. (2) 8 inch square samples of specified sheet materials to be exposed as finished surfaces.
 - a. Label samples with project data, color finish and gauge.
- E. Informational Data:
1. Qualification Data: Manufacturer's and installer's qualification data.
- F. Closeout Data (Section 01700):
1. Maintenance Data:

2. Warranty: Submit specified warranty.

1.05 QUALITY ASSURANCE

- A. Single-Source: Obtain sheet metal from one manufacturer.
- B. Installers Qualifications: Engage an experienced installer who has completed sheet metal flashing and trim work similar in material, design and extent to that indicated for this Project and with a record of successful in-service performance.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protect against damage and discoloration.

1.07 PROJECT CONDITIONS

- A. Coordinate work of this Section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance, durability of work and protection of materials and finishes.

1.08 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the SFSD of other rights the SFSD may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty on Factory Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - b. Chalk or oxidation in excess of No. 8 when tested according to ASTM D 4214
 - c. Fade or change color, in excess of five (5) DE (Hunter) units when tested according to ASTM D 2244.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.
- B. The contractor shall furnish, at no additional cost to the SFSD, a guarantee of the watertightness of the flashings. The warranty is limited to repairs due to ordinary wear from the elements and/or due to faulty materials and workmanship.
 1. Warranty Period: Five (5) year from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METALS

- A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
 2. Surface: Smooth, flat.
 3. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 4. Color: To match adjacent metal roof and wall panels. If not adjacent to panels, as selected by Architect from manufacturer's full range.
 5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.2 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch Wide and 1/8 inch thick.

SECTION 07620 – 3 SHEET METAL FLASHING & TRIM

- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- H. Roofing Cement: ASTM D 4586, Type I, asbestos free, asphalt based.

2.03 GENERAL FABRICATION

- A. Sheet Metal Fabrication Standards: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design dimensions, metal and other characteristics of the item indicated.
- B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Form exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
- D. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams and solder.
- E. Expansion Provisions: Space movement joints a maximum of 10 feet with no joints allowed within 24 inches of corners or intersection. Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently weatherproof and water proof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- G. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
- H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to view.

SECTION 07620 – 4 SHEET METAL FLASHING & TRIM

- I. Fabricate cleats and attachments devices form same materials as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
 1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.4 SHEET METAL FABRICATION

- A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.
- B. Exposed Trim and Fascia: Fabricate from the following material:
 1. Galvanized Steel: 24 gauge.
- C. Roof-Penetration Flashing:
 1. Galvanized Steel: 24 gauge.
- D. Misc. Flashing and/or Trim:
 1. Galvanized Steel: 24 gauge.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrate and conditions under which sheet metal flashing and trim are to be installed and verify that work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Verify dimensions, tolerances and method of attachment with other work.

3.2 INSTALLATION

- A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.
 1. Torch cutting of sheet metal flashing and trim is not permitted.
 2. Do not use graphite pencils to mark metal surfaces.
- B. Install exposed sheet metal work that is without excessive oil canning, buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

SECTION 07620 – 5 SHEET METAL FLASHING & TRIM

- C. Expansion Provisions: Provide for thermal expansion of flashing and trim. Space movement joints a maximum of 10 feet with no joints allowed within 24 inches of corners or intersection. Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently weatherproof and water proof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- D. Soldered Joints: Do not solder the following materials:
 - 1. Aluminum
 - 2. Coil-coated galvanized sheet.
- E. Sealed Joints: Form nonexpanding, but moveable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joints with sealant and form metal to completely conceal sealant.
- F. Separation: Separate metal from noncompatible metal or corrosive substrate by coating concealed surfaces, at location of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.
 - 1. Underlayment: Where installing stainless steel or aluminum directly on cementitious or wood substrate, install a slip sheet of red-rosin paper and a course of polyethylene underlayment.
 - 2. Bed flanges of work in a thick coat of roofing cement where required for waterproof performance.
- G. Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.03 ADJUSTING, CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
- B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.
- A. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

**SECTION 07720
SNOW RETENTION SYSTEM**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Snow guards for metal roofs

1.02 RELATED WORK

- A. Division 07400 – Metal Roof and Soffit Panels
- B. Division 07620 – Sheet Metal Flashing and Trim

1.03 PERFORMANCE REQUIREMENTS

- A. Aluminum Association (AA) – Aluminum Standards and Data, 2003 Edition.
- B. ASTM International (ASTM):
 - 1. B85-03 – Standard Specification for Aluminum-Alloy Die Castings.
 - 2. B221-04a – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.04 SYSTEM DESCRIPTION

- A. Attachment system to provide attachment to standing seam metal roofs:
 - 1. With only minor dimpling of panel seams.
 - 2. Without penetrations through roof seams or panels.
 - 3. Without use of sealers or adhesives.
 - 4. Without voiding roof warranty.
- B. Factor of safety: Utilize a factor of safety ≥ 2 to determine allowable loads from ultimate testing clamp tensile load values.
- C. Location: Unless otherwise specified in the drawings or specifications, the contractor is to assume that all metal roof systems on this project will receive a complete snow retention system.
 - 1. See Exterior Elevations for specific locations.
 - 2. A minimum of two rows of cross members (fence) required per roof section. Bottom row to be located no further than 12" above eave edge of roof.

1.05 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Submit for Review:

1. Shop Drawings: Show locations of snow guards on roof and attachment spacing and locations of cross member (fence) from eave edge of roof.
 2. Product Data: Include product description and installation instructions.
 - a. Clamp type to match approved metal roof submittal.
 3. Samples:
 - a. Clamp sample.
 - b. 24 inch long cross member samples including color-match metal strip, splice connector, and other hardware.
 4. Design calculations by authorized S-5 supplier.
 - a. Including quantity of all snow retention assembly parts
- C. Quality Control Submittals:
1. Test results: Results of product tensile load testing, issued by a recognized independent testing laboratory, showing ultimate load-to-failure value of attachment.
- D. Closeout Data:
1. Certification: Installer's certification that snow guard system was installed in accordance with manufacturer's instructions and approved Shop Drawings.

1.06 QUALITY ASSURANCE

- A. Single-Source: Obtain all components from one manufacturer.

1.07 WARRANTY

- A. Provide manufacturer's (1) one year warranty providing coverage against defects in materials and workmanship.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Contract Documents are based on S-5 Clamps and S-5! ColorGard by Metal Roof Innovations, Ltd. www.s-5.com
- B. Subject to compliance with requirements within this section, equivalent products by the following manufacturers are acceptable.
1. Sno Gem 2" iCLAD-S Snow Retention System.

2.02 COMPONENTS

- A. Clamps:

1. Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85 and AA Aluminum Standards and Data.
 2. Clamp Model: S-5-S. Verify model fits approved metal roof submittal product
 3. Set Screw: Two set screws made of 300 Series stainless steel, 18-8 alloy, 3/8" – 24 x 0.80" setscrew, with round nose point.
 4. Attachment Bolts: 300 Series stainless steel, 18-8 alloy, M8-1.25 x 16.00 mm, with hex flange bolt(s).
- B. Brackets:
1. Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data or cast aluminum.
 2. Model: VersaClip.
- C. Cross Member (fence):
1. Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.
 2. Model: ColorGard
 2. Receptacle in face to receive color-matched metal strips.
 3. Provide splice connectors ensuring alignment and structural continuity at end joints.
- D. Color Strips: Same material and finish as roof panels; obtain from roof panel manufacturer.
- E. Snow and Ice Clips: Aluminum, with rubber foot, minimum 3 inches wide.
1. SnoClip II (for metal roof standing seam heights 1"-1 1/2")

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions and proceed with work in accordance with Section 01700.
- B. Verify dimensions, tolerances and method of attachment with other work.
- C. Verify that installation may be made in accordance with approved shop drawings and manufacturer's instructions. If field measurements differ from contract drawings or shop drawings notify Architect prior to fabrication.
- D. Prior to starting work, notify general contractor about defects requiring correction.
- E. Do not start work until conditions are satisfactory.

3.02 PREPERATION

- A. Clean areas to receive attachments; remove loose and foreign matter that could interfere with installation or performance.

3.03 INSTALLATION

- A. Install system in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Place clamps at maximum 32 inches on center or as required by in-service loads.
- C. Place clamps in straight, aligned rows.
- D. Place both set screws on same side of clamp.
- E. Setscrews should be tensioned and re-tensioned as the seam materials compresses, i.e. tighten the first setscrew, then the second, then repeat until each setscrews achieves the recommended torque.
- F. Tighten set screws to manufacturer's recommended torque. Randomly test set screw torque using dial-calibrated torque wrench.
- G. Insert color-matched metal strips into cross members, staggering strips to cover cross member joints.
- H. Attach cross members to clamp; tighten bolts to manufacturer's recommended torque.
- I. Install splice connectors at cross member end joints.
- J. Do not cantilever cross members more than 4 inches beyond last clamp at ends.
- K. Install SnoClips at spacing's indicated on approved Shop Drawings.
- L. Bottom row to be located no further than 12" above eave edge of roof.

END OF SECTION

SECTION 07920 JOINT SEALANTS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Work consists of furnishing all labor, materials, and equipment for the complete installation of sealant and caulking as indicated on the drawings and specified herein. Work is primarily at perimeter of hollow metal doorframes, interior and exterior, and other penetrations in outside walls of buildings, and at concrete construction joints.
- B. The required applications of sealants includes, but is not necessarily limited to, the following general locations:
 - 1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces.
 - 2. Exterior joints in horizontal traffic surfaces.
 - 3. Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 4. Interior joints in horizontal traffic surfaces.
 - 5. Interior joints in wet and humid locations.

1.02 RELATED REQUIREMENTS

- A. Section 04300 – Concrete Unit Masonry
- B. Section 08100 – Metal Doors and Frames
- C. Section 09910 – Architectural Paints and Coatings

1.03 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C510 - Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants.
 - 2. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer.
 - 3. ASTM C719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
 - 4. ASTM C794 - Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
 - 5. ASTM C834 - Specification for Latex Sealants.
 - 6. ASTM C920 - Specification for Elastomeric Joint Sealants.
 - 7. ASTM C1193 – Guide for use of Joint Sealants.
 - 8. ASTM C1248 – Test Method for Staining of Porous Substrate by Joint Sealants
 - 9. ASTM D2203 – Standard Test Method for Staining from Sealants.
 - 10. ASTM D2240 – Test Method for Rubber Property – Durometer Hardness
 - 11. 2015 IECC – C402 Building Envelope Requirements

1.04 SUBMITTALS

- A. Submit product data and samples in accordance with Section 01300.
- B. Submit manufacturer's surface preparation and installation instructions.
- C. Color Samples for Initial Selection: Manufacturer's color charts (Hard copy, electronic copies will not be accepted) consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- D. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
- E. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.
- F. Qualification Data for qualified applicator(s).
- F. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Coordination: Coordinate installation of joint sealants with cleaning of joint sealant substrates and other operations that may impact installation or finished joint sealant work.
- D. Preconstruction Compatibility and Adhesion Testing: Submit to joint sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use manufacturers standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Testing will not be required if joint sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

- E. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
 - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
 - 3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.
- F. Washing State Energy Code requirements: Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joints for its entire length so as not to dislodge, loosen, or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation (C402.4.2)

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
 - 2. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.08 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive SFSD of other rights SFSD may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Installers Warranty: Original statement on Installers letterhead in which Installer agrees to repair or replace joint sealants that demonstrate deterioration or failure within warranty period specified.
 - 1. Warranty Period: Two (2) years from date of Substantial Completion.
- C. Special Manufacturer's Elastomeric Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period starting from the date of substantial completion.
 - 1. Urethanes Horizontal: Five (5) years.
 - 2. Urethanes Vertical: Ten (10) years.
 - 3. Silicones: Twenty (20) years.
- D. Deterioration or failure is defined to include but not by way of limitation, leaking, blistering, adhesion failures, cohesion failures, unusual deterioration or aging of materials and other unusual and unsatisfactory conditions.
- E. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Name and addresses of manufacturers of products specified herein are as follows:
 - 1. Dow Corning Corporation, Midland, Michigan.

2. General Electric Company, Silicone Products Division, Waterford, New York.
3. Mameco International, Cleveland, Ohio.
4. Pecora Corporation, Harleysville, Pennsylvania.
5. Sika Chemical Corporation, Lyndhurst, New Jersey.
6. Sonneborn Building Products Division, Contech, Minneapolis, Minnesota.
7. Tremco Commercial Sealants & Waterproofing, Beachwood, Ohio.
8. Woodmont Products Incorporated, Huntingdon Valley, Pennsylvania.

2.02 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants and accessory materials that are compatible with one another, and with adjacent materials, as demonstrated by sealant manufacturer.
- B. Joint Sealant Standard: Comply with ASTM C920 and other specified requirements for each sealant.
 1. Designations for Sealant Type, Grade, Class and Use.

Type S:	Single-component sealant, requires no jobsite mixing.
Type M:	Multi-component sealant, Must be mixed on the jobsite before installation
Grade P:	Pourable or self-leveling for horizontal applications.
Grade NP:	Non-sag for vertical applications.
Class 25:	Sealants shall withstand an increase and decrease of at least 25% of the joint width under normal usage.
Class 12.5:	Sealant shall withstand an increase and decrease of at least 12.5% of the joint width under normal usage.
Class 100/50:	Sealant shall withstand 100% expansion and 50% contraction.
Use T:	Pedestrian and vehicular traffic areas such as walkways, interior slabs, decks, parking garages, and ramps
Use NT:	Non-traffic areas, horizontal and vertical surfaces.
Use I:	Sealants that is suitable for sealing applications that will be submerged once the sealant is cured.
Use M:	Sealants meeting the specification when tested on mortar.
Use G:	Sealants meets this specification when tested on glass.
Use A:	Sealant meets this specification when tested on aluminum.
Use O:	Sealant meets this specification when tested on substrates other than the above.
- C. Stain Test Characteristics: Where sealants are required to be nonstaining, provide sealants tested per ASTM C1248 as non-staining on porous joint substrates specified.

2.03 SEALANT SYSTEMS

- A. TYPE 1: Exterior Dynamically Moving Joints (one inch or less in width)
 1. Single-Component, Non-Sag, Non-Staining, Neutral Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, Use NT. UV resistant.
 - a. Silpruf Sealant: General Electric Company, Silicon Products Div., Waterford, New York.
 - b. 790 Building Sealant: Dow Corning Corp., Midland, Michigan.
 - c. 864 Architectural Silicone: Pecora Corp., Harleysville, Pennsylvania.
 - d. Spectrem 1 Sealant: Tremco, Inc., Beachwood, OH

2. Color: As selected by Architect from manufacturer's standard line of not less than 10 colors.
 3. Closed cell backer-rod. Use as required to support sealant.
- B. TYPE 2: Nonmoving Horizontal Joints in concrete slabs and walkways (up to 6% slope):
1. Single-Component, Pourable, Self-leveling, Traffic Grade Polyurethane Joint Sealant: ASTM C920, Type S, Grade P, Class 50, Use T.
 - a. Tremco Vulkem 45SSL or equal
 - i. Movement Capability (ASTM C719): +100%/-50%
 - ii. Tensile Strength (ASTM D412): 250-300 psi
 - iii. Elongation (ASTM D412): 600-750%
 - iv. Tear Strength (ASTM D412): 35 pli (156N)
 2. Color: As selected by Architect from manufacturer's standard line of colors.
- C. TYPE 3: General Purpose Interior Perimeter Joints (one inch or less in width).
1. Single-Component, Silicone Sealant
 - a. Spectrem 1 Sealant: Tremco, Inc., Beachwood, OH
 - b. Chem-calk 1200: Woodmont Products, Inc., Huntingdon Valley, Pennsylvania.
 2. Color: As selected by Architect from manufacturer's standard line of colors.
 3. Closed cell backer-rod. Use as required to support sealant.
- D. TYPE 4: Interior Joints in areas with possible wet and humid conditions.
1. Single-Component, 100% Silicone Sealant, Mildew Resistant (at wet interior areas)
 - a. 786 Mildew-Resistant Silicone Sealant: Dow Corning Corp., Midland, Michigan.
 - b. Sanitary Sealant: General Electric Company, Silicone Products Div., Waterford, New York.
 - c. Pecora 898: Pecora Corporation
 - d. Trensil 200: Tremco, Inc., Beachwood, OH
 2. Color: As selected by Architect from manufacturer's standard line of colors.
- E. TYPE 5: Interior Slight to Non-Moving Joints at plywood ceiling.
1. Siliconized Acrylic Latex Sealant: ASTM C 834; non-sag, not-staining, non-bleeding.
 - a. Tremflex 834: Tremco, Inc., Beachwood, OH
 - i. Movement Capability: +/-12%
 - b. AC-20 + Silicone: Pecora Corporation
 2. Color: Paint Grade.

2.04 ACCESSORIES

- A. Primer: Nonstaining type, recommended by sealant manufacturer to suit application.
- B. Joint cleaner: Noncorrosive and nonstaining type, recommended by sealant manufacturer and compatible with joint substrates.
- C. Cylindrical Sealant Backings (Backer Rod): ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Type C: Closed-cell material with a non-absorbing outer surface skin.
 - 2. Type B: Bicellular material with a non-absorbing outer surface skin.
 - 3. Type: Any material indicated above.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide selfadhesive tape where applicable.
- E. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that joint dimensions and physical and environmental conditions are acceptable to receive work of this section.
- B. Beginning of installation means acceptance.

3.02 PREPARATION

- A. Clean, prepare, and size joints in accordance with manufacturer's instructions. Remove any loose materials and other foreign matter which might impair adhesion of sealant.
- B. Remove curing compounds, laitance, form-release agents, dust and other contaminants.
- C. Verify that joint substrates and release tapes are compatible with sealant.
- D. Examine joint dimensions and size materials to achieve required width/depth ratios.
- E. Use joint filler to achieve required joint depths, to allow sealants to perform properly.
- F. Where joints are more than 3/4 inch deep, install joint filler to within 1/2 inch of surface.
- G. Where joint is more than 1/2 inch deep, install joint filler to within 1/4 inch of surface.
- H. Where joint is less than 1/2 inch deep, apply bond breaker tape to bottom of joint to prevent adhesion of sealant to joint bottom.

- I. Prime or seal joint surfaces wherever recommended by the sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.

3.03 INSTALLATION

- A. Install sealant in accordance with manufacturer's instructions.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
 - 4. Install joint backing to maintain the following joint ratios:
 - a. Joints up to ½ inch wide: 1:1 width to depth ratio.
 - b. Joints greater than ½ inch wide: 2:1 width to depth ratio; maximum ½ inch joint depth.
 - 5. Install bond breaker tape over substrates when sealant backing are not used.
- D. Masking: Mask adjacent surfaces to prevent staining or damage by contact with sealant or primer.
- E. Joint Priming: Prime joint substrates when recommended by sealant manufacturer or when indicated by preconstruction testing or experience. Apply recommended primer using sealant manufacturer's recommended application techniques.
- F. Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature ranges.
- G. Install sealants using methods recommended by sealant manufacturer, in depths recommended for application. Apply in continuous operation from bottom to top of joint vertically and horizontally in a single direction. Apply using adequate pressure to fill and seal joint width.
 - 1. Tool sealant immediately with appropriately shaped tool to force sealants against joint backing and joint substrates, eliminate voids and ensuring full contact.
 - 2. Install sealant free of air pockets, foreign embedded mater, ridges, and sags.
 - 3. Tool exposed joint surface concave using tooling agents approved by sealant manufacturer for application. Concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- H. Install sealant before painting only if it is recommended as paintable by the sealant manufacturer, otherwise do all sealing after painting is completed.

- I. Installation of Acoustical Sealant: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations on both sides of assemblies with continuous bead of acoustical sealant. Comply with ASTM C 919 and with manufacturer's written recommendations.
- J. Install continuous bead of sealant at all the following, but limited to, joints:
 - 1. CMU Interior and Exterior joints
 - 2. Plywood joints and fastener holes
 - 3. Wall and ceiling penetrations
 - 4. Wall to window frame joints (interior and exterior side)
 - 5. Wall to ceiling joints
 - 6. Cove trim to ceiling joints and fastener holes
 - 7. Door frame to wall joints (interior and exterior side)
 - 8. All metal wall panel penetrations
 - 9. Wall to louver frame joints (interior and exterior side)
 - 10. OH Door joints that could allow air flow between the exterior to interior conditioned space
 - 11. Slab and concrete wall joints and penetrations
 - 12. Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in order to comply with energy code requirements
- K. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
 - 1. Install in compliance with 2015 IECC, C402 Building Envelope Requirements

3.04 CLEANING

- A. Remove excess and spillage of compounds promptly as the work progresses. Clean the adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage, without damage to the adjoining surfaces of finishes.
- B. Remove masking tape immediately after tooling joint without disturbing seal.

END OF SECTION

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SECTION 08110
METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Work consists of furnishing all labor, materials, and equipment for the installation of metal doors and frames.
- B. Section included
 - 1. Insulated core steel doors
 - 2. Metal door frames
 - 3. Prepare doors and frames to receive hardware specified in Section 08710.

1.02 REFERENCES

- A. ANSI A250.4 – Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Hardware Reinforcing.
- B. ANSI A250.7 – Nomenclature for Standard Steel Doors and Steel Frames
- C. ANSI A250.8 – Recommended Specifications for Standard Steel Doors and Frames.
- D. ANSI A250.10 – Standard Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- E. ASTM A653 – Standard Specifications for Steel Sheet, Zinc-Coated (Galvannealed) by the Hot-Dip Process.
- F. ANSI A250.11 – Recommended Erection Instructions for Steel Frames.
- G. ASTM A1008 - Standard Specification for Steel Sheet, Cold-rolled, Carbon, Structural High-Strength Low-Alloy and High-Strength Low-Allow with Improved Formability.
- H. ASTM C1363 – Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of Hot Box Apparatus.
- I. ASTM D1735 – Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus.
- J. SDI-112 – Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors and Frames.

1.03 RELATED WORK

- A. Section 04300 – Reinforced Unit Masonry
- B. Section 07920 – Joint Sealants.
- C. Section 08710 – Door Hardware.
- D. Section 09910 – Architectural Paints and Coatings.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01330.

- B. Product data: for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes. Clearly highlight or flag gauges of all door and frame components as specified in this section.
 - 1. Submit data on Corrosion-Resistant Coating as specified in this section.
- C. Shop drawings: Submit drawings for fabrication and installation of steel doors and frames.
 - 1. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements and details of joints and connections. Show anchorage and accessory items.
- D. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings.
 - 1. Indicate coordination of glazing frames and stops with glass and glazing frames and stops with glass and glazing requirements.

1.05 QUALITY ASSURANCE

- A. Provide doors and frames complying with ANSI A250.8/SDI 100 "Recommended Specifications for Standard Steel Doors and Frames" as specified.
- B. Certification of label construction. For components exceeding Underwriters Laboratories, Inc. (UL), furnish inspection certificate stating that components construction conforms to UL rating requirements only if Architect is aware of such a limitation and has allowed the non-labeled unit.
- C. Fire-Rated door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per ASTM E 152, and are labeled and listed by UL, Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors conform to all standard construction requirements of tested and labeled fire-rated door assemblies except for size.
 - 2. Temperature-Rise Rating: Where required by code, provide doors that have a temperature-rise rating of 450 deg F maximum in 30 minutes of fire exposure.
- D. Single Source: Provide doors, frames, and builders hardware through one source.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames in cartons or crates to provide protection during transit and storage.
- B. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided the finish items are equal in all respects to new work and acceptable to the Architect; otherwise, remove and replace damaged items as directed.

- C. Store doors and frames at the building site under cover. Place units on minimum 4-inch high wood sills or on floors in a manner that will prevent rust and damage. Avoid the use of non-vented plastic or canvas shelters which could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4 inch spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, equivalent products by the following manufacturers are acceptable.
 - 1. Steel Doors and Frames:
 - a. Ceco Door Company
 - b. Curries Company
 - c. Republic Builders Product
 - d. Steelcraft

2.02 MATERIALS

- A. Steel sheets:
 - 1. Carbon steel complying with ASTM A1008, commercial quality.
 - 2. Hot-Dip galvanized to ASTM A924 and ASTM A653 – Standard Specifications for Steel Sheet, Zinc-Coated (Galvannealed) by the Hot-Dip Process.
 - a. Doors, Frames and All Components: Hot-dipped galvanized steel to have either G60 zinc (galvanized) or A60 zinc-iron alloy coating (galvanneal) with a coating weight of not less than 0.60 ounces per square foot (0.30 ounces per square foot per side).
 - b. Galvanized steel shall be treated to insure proper paint adhesion.
 - c. All steel component parts used in galvanized doors and frames shall meet the galvanizing specifications.
 - d. All frames to be hot-dip galvanized after fabrication has been completed.

2.03 METAL DOOR FABRICATION

- A. General: Fabricate doors in accordance with ANSI A250.8/SDI 100, Level III (16 gauge), Model 2 (seamless design), to sizes shown, providing necessary clearances and bevels to permit operation without binding. Door shall be free from warp, wave, buckle and other defects.
- B. Door Construction:
 - 1. Thickness: 1-3/4 inches, unless indicated otherwise.
 - 2. Fabricated with face sheets of 16 gauge hot-dipped zinc coated steel.

3. Both lock edge and hinge rail edge of the door shall be welded, epoxy or weld filled and ground smooth the full height of the door to make them invisible and provide a smooth flush surface.
 4. Edge Profiles:
 - a. Lock Edge: Bevel 1/8 inch in 2 inch. Square edge is not acceptable.
 - b. Hinge Edge: Square.
 5. End Channels: Provide with top and bottom inverted 14 gauge steel channels welded within the door to both face sheets. All doors to have tops closed to eliminate moisture penetration. Door tops shall NOT have holes, openings or be constructed of plastic. Top caps are permitted and shall not be less than 18 gauge, welded in place. Closed tops are to be filled and ground smooth prior to prime coat.
 6. Reinforce, stiffen and sound deaden with self-extinguishing, non-toxic, polystyrene foam core completely filling inside of door and chemically bonded to the entire inside of all face sheets.
 7. Double Door (Pair) "Z" Astragal:
 1. 14 Gauge galvaneal.
 2. Manufactures welded vertical "Z" profile to door leaf, latch side.
 3. Notched at top to clear frame stop at head.
 4. Prepared to receive top and bottom flush bolts and mortice lock strike plate.
 5. See Section 08710 – Door Hardware for astragal bulb seal and other associated door hardware.
 6. Paint to match doors.
 7. Do Not notch Astragal for strike. Door hardware calls for flat - no lip strike. See Section 08710
- C. Thermal Rated Assemblies: Provide door and frame operable assemblies tested in accordance with ASTM C1363 at exterior locations. Unless otherwise indicated, minimum U-factor for thermal-rated operable assemblies is 0.36 BTU/hr (ft²) deg. F (R-2.77).
1. Core System: Polyurethane.
- D. Preparation for Hardware:
1. Hinge reinforcement: 7 gauge projection welded hinge reinforcements at each hinge cutout.
 2. Lock reinforcement: 16 gauge.
 3. Closer reinforcement: 14 gauge – minimum 6" x 20" long.
 4. Hinge and lock reinforcements shall be projection welded to the edge of the door.
 5. Galvanized doors shall have galvanized hardware reinforcements.

6. Adequate reinforcements shall be provided for the other hardware as required.
 7. Door shall be mortised, reinforced, drilled and tapped at the factory for templates for all mortise hardware listed in the hardware schedule.
 8. Door shall be reinforced only for surface applied hardware such as closers, checks, escutcheons and kick plates, the drilling and tapping for which is to be done in the field by the door erector.
 9. Door shall be provided with reinforcing unit as recommended by lock manufacturer.
 10. Hardware Mounting Height and Door Clearances: In accordance with ANSI industry standards.
 11. Doors shall not show any visual indication of metal fatigue, cracking or deformation at hardware and vision lite cutouts or along form contours.
- E. Glass: Not used in on this project.

2.04 METAL FRAME FABRICATION

- A. General: Pressed, double rabbeted metal frames shall be formed to shapes and sizes shown. Head and jambs are to be notched, mitered, fully (continuously) welded, grinded and finished to present a smooth surface for painting. Knock-down frames are not acceptable.
- B. Frames shall be fabricated from 14 gauge hot-dipped G60 zinc coated steel, and shall be designed with integral stop and trim. Mitered corners shall be fully (continuously) welded and reinforced with 18 gauge channel shaped reinforcements.
- C. Jamb Anchors: Frame anchors shall provide stiffness and rigidity to keep frames square, in accurate position without twisting, buckling or warping.
 1. Provide minimum 3 anchors at jamb end of frames. Provide 2 head jamb anchors at frames over 4'.
 2. Wood stud construction: 18 gauge galvanized steel sheet, U-shaped type to engage stud, welded to back of frame. Loose anchors are not acceptable.
 3. Concrete masonry: Adjustable galvanized "tee" anchors. Install in course mortar as work progresses.
 4. Cast-in-place concrete walls: Use cabinet type frames anchored to concrete as per manufacturers printed recommendations, using expansion bolts.
- D. Floor Anchors: For each jamb which extends to floor, provide clip-type anchors formed of not less than 16 gauge galvanized steel sheet, welded to back of frame, with 2 holes to receive fasteners.
- E. Preparation for Hardware: Frame shall be prepared at the factory for all hardware using templates furnished by hardware supplier. Locations of miscellaneous hardware shall conform to the recommendations for the Door and Hardware Institute (DHI). Mortise,

reinforce, drill and tap for all mortise type hardware. Reinforce for surface applied hardware, the drilling and tapping for which is to be done in the field by door erector.

1. All hardware cutouts shall have steel plate reinforcements with tapped holes welded to frame. Reinforcement shall include 3/16- inch butt reinforcement. All cutouts and reinforcing to receive fasteners shall have mortar box/cover box.
 - a. Strike reinforcement: 16 gauge steel reinforcement projection welded strike reinforcement with integral dust/mortar box. Reinforcement to include extruded attaching holes to provide adequate threaded for the strike plate screws.
 - b. Hinge reinforcement: 7 gauge projection welded hinge reinforcements at each hinge cutout.
 - c. Closure and surface applied item reinforcement: 11 gauge steel reinforcement plate welded to inside of frame for closure reinforcement and surface applied items. Provide both parallel and standard at all openings.
 - d. Mortar Boxes: Provide 16 gauge steel mortar/cover boxes, welded to frame at back of all mortised cutouts where mortar or other materials might obstruct hardware installation and operation.
 - e. Rim exit strike preparation: 14 gauge steel reinforcement plate welded to inside of frame for surface mounted rim exit strikes. Minimum of 8 1/2 inches long.
 - f. Vertical rod strike preparation: 14 gauge steel reinforcement plate welded to inside of frame. Minimum of 14 inches long. Drilling and tapping to be done in field.
 2. Provide strike stops at frames to receive metal doors with holes for three (3) rubber door silencers. On double doorframes, provide for two (2) silencers per door at head. Omit holes at frames to receive unitized weather stripping.
- F. Removable Spreaders: Provide removable metal spreaders for frame to prevent damage during shipment and handling. Touch up with field applied galvanizing treatment after removal.

2.05 FACTORY APPLIED PRIMER

A. Prime Finish:

1. All doors, frames and frame components shall be cleaned, phosphatized and finished as standard with one coat of electrostatic applied, baked-on rust inhibiting prime paint in accordance with ANSI A250.10 meets or exceeds ASTM D1735 water fog test for coatings for 200 hours.
2. Prime paint to be fully cured prior to shipment.
3. Field applied primer will not be accepted.
4. See Section 09910 for intermediate (tie-coat) and final coating requirements.

2.06 FIELD APPLIED FINISHES

- A. All doors, frames and components shall be cleaned and finished in accordance with the manufacturer's instructions.

- B. Refer to Section 09910 – Architectural Paints and Coatings for Intermediate (tie-coat) and finish coating requirements.
- C. Intermediate and Finish coats shall cover 100% of all accessible surfaces (mortised hinge pockets, top and bottom edges of doors, etc.) prior to installation of any door hardware!

2.07 ACCESSORIES

- A. Insulating Foam Sealant: See 3.01.B.6 below.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install steel doors, frames and accessories according to shop drawings, manufacturer's data and as specified.
- B. Placing Frames: Comply with provision of SDI 105 "Recommended Erection Instructions for Steel Frames", unless otherwise indicated. Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged. Install silencers.
 - 1. In masonry construction, install at least three (3) wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb.
 - 2. At existing concrete or masonry construction, install at least three (3) completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb.
 - 3. In metal stud partitions, install at least three (3) wall anchors pre jamb at hinge and strike levels. In steel stud partitions, attach wall anchors to studs with screws.
 - 4. Grouting: Do not grout frames. Fill with frames with insulating foam.
 - 6. Insulating Foam Sealant:
 - a. Prior to installing exterior metal door frames in CMU, wood or steel framed walls, infill throat (cavity) of frames with expanding polyurethane insulating foam such as Great Stuff – Big Gap Filler. Allow to fully cure rigid and screed trim excess to allow proper installation of frame.
 - b. After final installation and prior to final joint sealant, continuously seal perimeter gaps with low-pressure formulated, flexible polyurethane foam sealant such as Great Stuff – Window and Door.
- C. Door Installation: Fit steel doors accurately in frames, within clearances specified in ANSI/SDI 100.

1. Fire-Rated Doors: Install in accordance with requirements of NFPA 80.
- D. Paint frames and doors in accordance with Section 09910.
 1. Doors and Frames: Doors and frames must be painted prior to installing any door hardware. Door hardware installed prior to painting will have to be removed (masking off hardware will not be allowed).
- E. Install hardware in accordance with Section 08710.
- F. Install continuous bead of sealant around interior and exterior door frame joints between frame and finished wall. See Section 07920 – Joint Sealants.

3.02 PROTECTION, ADJUSTING AND CLEANING

- A. Protection: Immediately before final inspection, remove protective wrapping from doors and frames.
- B. Galvanizing Touchup: Immediately after erection, sand smooth any rusted or damaged areas of galvanized coating and apply zinc rich type primer after proper cure time apply primer and then finish coat to match.
- C. Remove and replace defective work, including doors, which are warped, bowed, dented, buckled or otherwise unacceptable.
- D. Final Adjustments:
 1. Check and readjust operating finish hardware items just prior to final acceptance.
 2. Leave work in complete and proper operating condition.

END OF SECTION

**SECTION 08710
DOOR HARDWARE**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Work covered by this section of the specifications consists of furnishing and delivering to the job site for fitting and installation; all finish hardware complete, in accordance with this section and applicable drawings. It is intended that the following list of hardware will cover all finish hardware to complete the project. Omissions and discrepancies shall be brought to the Architects attention during the bidding period. Hardware for labeled openings shall meet U.L. requirements.
- B. Work included
 - 1. Templates for door and frame.
 - 2. All required screws, bolts, anchors, and the like, for proper fastening of each item of hardware.

1.02 RELATED WORK

- A. Section 04300 – Reinforced Unit Masonry (CMU)
- B. Section 07920 – Joint Sealants
- C. Section 08110 - Metal Doors and Frames

1.03 REFERENCES

- A. ANSI - American National Standards Institute
- B. BHMA - Builders Hardware Manufacturers Association

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Furnish five (5) typewritten hardware schedules for approval with attached cut sheets. Approval of schedule shall not relieve the contractor of responsibility for errors or omissions therein.
- C. Submit schedule in accordance to DHI publication on "Sequence and Format for the Hardware Schedule" and include explanation of all abbreviations, symbols and codes.
- D. Include cross-reference to hardware groups in the hardware schedule. Mark openings with the Architect's numbering and indicate each door and frame.
- E. Indicate type, style, function, size, hand, means of fastening and manufacture for each hardware item.

- F. Quantities listed are for the Contractor's convenience only and are not guaranteed. Items not specifically mentioned, but necessary to complete the work shall be furnished matching in quality, finish and design those items specified for similar locations.
- G. Submit one (1) copy of catalog cuts for each hardware item listed in the schedule. Catalog cuts must be of good reliable quality. Highlight each cut to readily show compliance with project requirements. When cut sheets list multiple products, clearly highlight or indicate item proposed for project.
- H. Provide samples if required by the Architect. Samples will be returned to be incorporated into the work.
- I. Furnish a complete and current set of templates to all other related material suppliers.
- J. Keying requirements will be discussed with the Owner, finalized and documented for submittal to the Owner.
- L. At the completion of the project three (3) copies of as-built hardware schedule including keying shall be sent directly to the Owner. Carbon copies of the transmittal letter and schedule shall be sent to the General Contractor and Engineer.
- M. Closeout Data (Section 01700):
 - 1. Maintenance Data:
 - 2. Warranty: Submit specified warranty
 - 3. Approved submittal information

1.05 QUALITY ASSURANCE

- A. The "scheduled" manufacturer's names and numbers shown in the hardware schedule are for the purpose of establishing quality, design and function. Only approved Manufacturers and model numbers will be accepted. A request for approval, in writing, indicating the "scheduled" manufacturer's catalog number and "substitution" manufacturer's proposed substitution catalog number must be submitted. Submit requests in accordance with Section 01630. In addition, catalog cuts, and physical samples (if requested), clearly labeled, must accompany the request for approval. All physical samples must be left with the Project Manager for whatever time that is required for his evaluation.
- B. Single Source: Provide doors, frames and builders through on source.
- C. Only recognized builders' hardware suppliers who have regularly engaged in furnishing hardware in the project vicinity for a minimum of two (5) years will be acceptable. This supplier must have in its employ a locksmith along with a Hardware Consultant currently a member of the American Society of Architectural Hardware Consultants, who is available at reasonable times, during the course of the work for consultation about the projects hardware details, installation or adjustment. Suppliers without certified consultants may be required to furnish a letter of qualification, listing similar projects furnished, including the Architects name, date and year and the project location.
- D. Provide hardware for fire rated openings in compliance with NFPA - 80 1995 edition.

1.06 DELIVERY, STORAGE AND HANDLING

SECTION 08710 – 2

DOOR HARDWARE

- A. Hardware shall be delivered to the project site in the manufacturer's original packaging, with appropriate markings indicating the location in accordance with the approved hardware schedule.
- B. Jointly inventory the hardware upon delivery with the Contractor and or Installer.
- C. Store all hardware in a clean, dry and secure room to prevent hardware from damage and loss.

1.07 WARRANTY

- A. General: Submit in accordance with Section 01300.
- B. The following items shall have warranty in excess of Section 01300.
 - 1. Door Closers: 10 years.
 - 2. Mortise Locks and Latches: Lifetime.
 - 3. Exit and Fire Exit Devices: 5 years.
- C. Warranty period shall begin from the date of substantial completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Materials, equipment, and accessories specified under this section shall be products of:

1. Hinges	ST	Stanley
2. Locksets	BE	Best
3. Deadbolts	BE	Best
4. Cylinders	BE	Best
5. Flush Bolts	RO	Rockwood
6. Closers	ST	Stanley
7. Overhead Stops	ABH	ABH
8. Thresholds	NG	National Guard
9. Door Sweeps/Shoes	NG	National Guard
10. Gasketing	NG	National Guard
11. Lock Guard	RO	Rockwood
12. Kickplates/Protective Items	RO	Rockwood
13. Rain Drip Guard	NG	National Guard
- B. Due to compatibility with existing keying and City of Moscow Door Hardware Guidelines equivalent products will not be allowed.

2.02 MATERIALS

- A. The following products have been selected to establish a level of quality, design and function. Furnish either the designated item or the approved alternate. Drawings show

SECTION 08710 – 3
DOOR HARDWARE

the direction of slide, swing and hand of each door. Furnish each item of hardware for proper installations and operation. Check door and frame types to ensure all additional installation accessories are included with the specified item.

- B. Related items: All necessary fastenings, brackets, clips, and other items necessary to install the hardware items in the best manner shall be furnished in the same material and finish as the related item and shall be furnished as a part of the project.

2.02 DOOR HANDLES

- A. All door handles on the project shall be of the Best 15D lever-type, Vandal Trim.

2.03 FASTENERS

- A. All screws shall be of matching finish to their product and shall be manufacturer's standard.

2.04 HINGES

- A. Doors 1-3/4 inch thick minimum, use 4-1/2 inch hinges, heavy duty weight, stainless steel.
- B. Each door shall have a minimum of three hinges. Each door over 7'-6" (90") shall have an additional hinge for each 30 inches of additional height, or fraction thereof.
- C. Exterior doors over 3'-2" wide and/or 7'-6" high shall have heavy weight hinges. Doors 8'-0" high or higher shall have (4) hinges. Hinges shall have non-removable stainless steel pins.
- D. Interior reverse bevel doors with lockable hardware shall have non-removable pin hinges.
- E. Hinges shall be sized in width to clear all trim.

2.06 LOCKSETS

- A. Type: Grade 1 Cylindrical Locks as per Schedule.
- B. Locks, cylinders and trim shall be the product of one manufacturer.
- C. Functions as shown in hardware sets.
- D. Provide 1/2-inch for cylindrical locks and 1-inch throw for deadbolts.
- E. Strike Plate: Standard strike plate with lip.
 - 1. The astragals on a double door can conflict with the active leaf lockset strike lip. In these instances, provide a non-lip strike. Astragals shall NOT be modified or altered (cut).

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DOOR HARDWARE

2.07 DOOR CLOSERS

- A. Door closers shall be fully adjustable type with complete spring power adjustment, sizes 2-6 and field adjustable according to door size and frequency of use. Closer shall have adjustable back-check.
- B. Where closers are indicated to be delayed action, provide units with adjustable delay.
- C. Provide all accessories for mounting required by door and frame types.

2.08 DOOR HOLDERS/STOPS

- A. Dead Stop Angle: 100° Min..
- B. Hold-Open/Stop Model:
 - 1. Concealed Mounted.
 - 2. Shock-absorbing.
 - 3. Control knob to turn hold open function on or off.
 - 4. Hold open tension adjustable.
 - 5. Hold Open Angle: 95° Min.

2.09 EXIT DEVICES

- A. Able to unlock and stay unlocked, however latch bolt to remain in latch position and require push bar to be pushed to open. No dogging permitted.
- B. Where function of exit device requires a cylinder, provide rim cylinder as required.

2.10 DOOR TRIM UNITS

- A. Fabricate protection plates not more than one inch less than door width on stop side of door and not less than one inch less than door width on pull side of door.
- B. Metal plates shall be of stainless steel and .050 or 18 ga.
- C. Provide manufacturer's standard exposed fasteners with through bolting on matched pairs.

2.11 THRESHOLDS AND WEATHERSTRIP

- A. Provide continuous weather-stripping at the edge of every exterior door leaf. Provide no corrosive fasteners as recommended by manufacturer.

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DOOR HARDWARE

- B. Provide thresholds with Flat head sleeve anchors on all exterior doors.
- C. Provide Pemkote anti-slip surface on all exterior thresholds.
- D. Threshold shall be installed in a minimum of two (2) beds of sealant.

2.12 DOOR SWEEPS

- A. Brush seals consisting of densely compressed nylon filaments encased in high quality aluminum retainers with slotted holes for adjustment.
- B. Mounting Locations:
 - 1. Exterior Out Swinging Doors: Hinge Side (exterior).
 - 2. Interior Doors: Hinge Side
- C. Finish: Clear Anodized Aluminum unless otherwise specified in hardware schedule.

2.13 PROTECTION PLATES

- A. Material: Stainless Steel - US32D
- B. Thickness: .050" Min.
- C. Height: 12" Min.
- D. Mounting: Stainless steel mechanical fasteners

2.14 FINISHES

- A. See hardware schedule at end of section.

2.16 KEYING

- A. Keying Schedule: After receipt of approved finish hardware schedule, hardware supplier shall prepare a keying schedule. Keying schedule shall then be discussed with Owner to ensure all locksets are functionally correct and keying fulfills desires of Owner. Copies of proposed keying schedule shall be given to Engineer and/or Owner with all corrections inserted into proposed schedule.
- B. The Contractor to provide and ensure keying system integrates with existing Best keying system used at other City of Moscow pump/booster building key system. The hardware supplier shall be responsible for obtaining all keying information from City of Moscow.
- D. Keys shall be furnished in the following quantities:

0 each Grandmaster

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DOOR HARDWARE

6	each	Master keys
0	each	Change keys/sub-master key
1	each	Control keys
3	each	Construction keys

- E. Construction Keying: Furnish all standard cylinder items with construction cores. Following construction, the hardware shall provide permanent cores as part of this contract. The hardware supplier shall insert all permanent cylinder cores into the locks and try each permanent key for operation before turning the permanent keys over directly to the Owner.

PART 3 - EXECUTION

3.01 EXAMINATION/PREPARATION

- A. Verify that all paint coating at door leaf's and frames have been completed and accepted. Do not install any door hardware until Section 09910 – Architectural Paint & Coatings have been completed.

3.02 INSTALLATION

- A. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames", By DHI. The local Authority having jurisdiction may have specific requirements that may apply.
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Whenever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes, reinstall each item. Do not install surface-mounted items until finishes have been completed on the substrate.
- C. Set all hardware plumb and true to locations specified in the installation instructions.
- D. Set thresholds for exterior doors in a bed of butyl-rubber sealant.
- E. Upon completion of installation, verify hardware has been installed in accordance with the approved finish hardware schedule. Check hardware for proper placement and operation. Hardware found to be incorrectly installed or damaged, will be repaired or replaced.

3.03 ADJUSTMENT

- A. After inspection of the installation and operation by Engineer, the Contractor shall readjust all items of operating hardware as required.
- B. Wherever hardware installation is made more than four (4) weeks prior to acceptance or occupancy of a space or area, return to work prior to acceptance of occupancy and make final check and adjustment of all hardware. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices

to compensate for final operation of air conditioning and ventilating equipment. Hardware to be found defective shall be repaired or replaced.

- C. Instruct OWNER's personnel in proper adjustment and maintenance of hardware and finishes during the final adjustment period.

3.04 PROTECTION AND CLEANING

- A. After installation, all hardware surfaces shall be cleaned on both interior and exterior of all mortar, plaster, paint and other contaminants. After being cleaned, all work shall be protected against damage.

3.05 SPECIAL TOOLS

- A. Provide three (3) sets of any special tools, required for installation and maintenance of hardware to Owner.

3.05 SCHEDULE

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DOOR HARDWARE

- A. Refer to the Door Schedule on the drawings to relate the Hardware Group (HG) to specific doors.

Mfr.	Qty.	Description	Model No.	Finish
HW-01				
Door(s): B1-100A, B2-100A (<i>Exit door from Electrical Room to Exterior</i>)				
ST	3	EA Hinge	FBB199 NRP 4.5 x 4.5	US32D/630
BE	1	EA Cylindrical Lock	9K37AB 15D S3	626
BE	1	EA Deadbolt	8T37K STK	626
RO	1	EA Heavy Duty Latch Guard	325	US32/630
ST	1	EA Surface Closer (hold open)	D4550 H-EDA SRI	689
ABH	1	EA Concealed Overhead Stop	1023	US32D/630
RO	1	EA Kick Plate	K1050 10" x 34" BEV	US32D/630
NG	1	EA Threshold	425E x 36" SIA	Alum
NG	1	EA Gasketing	5050CL 36" x 84"	Clear
NG	1	EA Rain Drip Guard	16A x 40"	Anodized Alum
NG	1	EA Sweep	C627A x 36"	Anodized Alum

HW-02

Door(s): B1-100B (Pair), B2-100B (Pair) (*Exit door (active) from Electrical Room to Exterior*)

ST	6	EA Hinge	FBB199 NRP 4.5 x 4.5	US32D/630
BE	1	EA Cylindrical Lock	9K37AB 15D S3	626
BE	1	EA Deadbolt	8T37K STK	626
TR	2	EA Flush Bolt	3917-12	626
TR	1	EA Dust Proof Strike	3910	630
RO	1	EA Heavy Duty Latch Guard	325	630
ST	1	EA Surface Closer (active door)	D4550 H-EDA SRI	689
ABH	1	EA Concealed Overhead Stop (active door)	1023	US32D/630
ABH	1	EA Concealed Overhead Stop/Hold (inactive door)	1013	US32D/630
RO	2	EA Kick Plate	K1050 10" x 34" BEV	US32D/630
NG	1	EA Threshold	425E x 72" SIA	Alum
NG	1	EA Gasketing	5050CL 72" x 84"	Clear
NG	1	EA Gasketing (astragal)	5050CL 72"	Clear
NG	1	EA Rain Drip Guard	16A x 76"	Anodized Alum
NG	2	EA Sweep	C627A x 36"	Anodized Alum
-	1	EA Astragal	By Door Manufacturer	
			See 08100-Metal Doors & Frames	Painted

END OF SECTION

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DOOR HARDWARE

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**SECTION 09900
HIGH-PERFORMANCE COATINGS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Furnishing and applying protective coatings of paint to all surfaces indicated on the Drawings or specified herein, including all surface preparation and related work.
- B. Architectural coatings are specified in Section 09910.

1.2 EXCLUSIONS

- A. Painting is not required for the following surfaces or items unless otherwise shown on the Drawings, specified in other sections, or specified herein:
 - 1. Stainless steel, aluminum (except where in contact with concrete), chrome, fiberglass, copper instruments, pressure gauge tubing, and structural FRP. (unless noted on plans or finish schedules.)
 - 2. Electrical panels, motor control centers, pumps, and motors having a factory finish. The factory finish shall be approved by the Engineer. Non-approved factory finishes shall be painted as specified hereinafter.
 - 3. Surfaces hidden from view such as piping, ducts, structural wood, and insulation.

1.3 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
 - 1. American National Standards Institute (ANSI)
 - a. Standard Colors for Color Identification and Coding
 - b. A13.1, Scheme for the Identification of Piping Systems
 - 2. American Water Works Association (AWWA)
 - a. C203, Coal-Tar Protective Coatings and Linings for Steel Water Pipelines-Enamel and Tape-Hot-Applied
 - b. C210, Liquid Epoxy Coating System for the Interior and Exterior of Steel Water Pipelines
 - c. C214, Tape Coating Systems for the Exterior of Steel Water Pipelines
 - 3. NSF International (NSF): 61 Drinking Water System Components-Health Effects
 - 4. National Association of Corrosion Engineers (NACE): Manual for Painter Safety

5. Occupational Safety and Health Act (OSHA)
6. Steel Structures Painting Council (SSPC)
 - a. QP1, Standard Procedure for Evaluating Qualifications of Painting Contractors
 - b. QP2, Standard Procedure for Evaluating the Qualifications of Painting Contractors to Remove Hazardous Paint
 - c. SP 1, Surface Preparation Specification No. 1, Solvent Cleaning
 - d. SP 2, Hand Tool Cleaning
 - e. SP 3, Power Tool Cleaning
 - f. SP 5, White Metal Blast Cleaning
 - g. SP 6, Commercial Blast Cleaning
 - h. SP 7, Brush-Off Blast Cleaning
 - i. SP 8, Pickling
 - j. SP 10, Near-White Blast Cleaning
 - k. SP 11, Power Tool Cleaning to Bare Metal
 - l. SP 12, High Pressure Water Jetting
 - m. SP 13, Surface Preparation of Concrete
 - n. Guide No. 3, PA, Guide to Safety in Paint Applications
7. Ductile Iron Pipe Research Association (DIPRA): Surface Preparation Specifications

1.4 SUBMITTALS

A. Shop Drawings

1. Data Sheets, including catalog cuts and color charts.
 - a. Material Safety Data Sheets (MSDS), the manufacturer's Technical Data Sheets, and paint colors available (where applicable) for each product used in the paint system.
 - b. Submit required information on a system-by-system basis.
 - c. Furnish copies of paint system submittals to the coating applicator.
 - d. Indiscriminate submittal of manufacturer's literature only is not acceptable.
2. Detailed chemical and gradation analysis for each proposed abrasive material.
3. System Application Process (for each coating system):
 - a. Contractor shall indicate surface preparation, primer, stripe coat, finish coat, and quality control parameters as indicated in Section 3.7.

SECTION 09900 - 2 HIGH-PERFORMANCE COATINGS

- b. Submittal shall include a detailed pre-installation packet with on-site photographs of each edge and transition termination around pipes, gates, frames, edge of coating etc. Drawings on the photographs shall indicate the termination method to be used, in conformance with the coating system manufacturer's recommendations.
 - c. Submittals shall be approved by the coating manufacturer, the applicator and the General Contractor that is specific to each application system.
- B. Quality Control Submittals
 - 1. Applicator's Qualification: List of references substantiating experience.
 - 2. Factory-Applied Coatings: Manufacturer's certification stating factory-applied coating system meets or exceeds requirements specified.
 - 3. If the manufacturer of finish coating differs from that of shop primer, provide both manufacturers' written confirmations that materials are compatible.
 - 4. Manufacturer's written instructions and special details for applying each type of paint.
 - 5. Manufacturer's written verification that submitted material is suitable for the intended use.
- C. Extended Warranty Certificates
- D. Contract Closeout Submittals: Extended Warranty Certificate

1.5 QUALITY CONTROL

- A. Qualifications of Applicator: Minimum 5 years' experience in application of specified products.
- B. Contractor's Responsibilities
 - 1. The Contractor shall perform first-line, in-process QC inspections and testing in accordance with the level of quality control specified for each coating system.
 - 2. The Contractor shall use the "Daily Coating Inspection Report" found at the end of this specification to record the results of quality control inspections and tests. The completed reports shall be turned in to the Engineer before work resumes the following day.
 - 3. The Contractor shall supply all necessary equipment to perform the QC tests. The instruments shall be calibrated by the Contractor's personnel according to the equipment manufacturer's recommendations and the Contractor's QC Program. All inspection equipment shall be made available to the Engineer for QA observations on an as-needed basis.

SECTION 09900 - 3 HIGH-PERFORMANCE COATINGS

4. Equipment shall include the following at a minimum:
- Recording thermometer.
 - Hygrometer.
 - Recording or comparable equipment for the recording of dew point and continuous recording of relative humidity.
 - Surface temperature thermometer.
 - Hypodermic Needle Pressure Gage for determining blasting pressure at the nozzle.
 - Visual Standard for abrasive blast cleaning.
 - Testex Press-O-Film Replica Tape and Spring Micrometer.
 - Wet Film Thickness Gage.
 - Blotter paper and plate glass for compressed air cleanliness checks.
 - Magnetic Dry Film Thickness Gage with calibration standards.
 - Holiday Detector: Non-destructive wet sponge-type detector. Operating test voltage shall be per NACE RO-02-74 or as recommended by the Coating Manufacturer's representative.
 - A non-sudsing-type wetting agent such as Kodak Photo-Flo, or equal, shall be added to the water prior to wetting the detector sponge.

C. Quality Assurance (QA) Observations by Engineer

1. The Engineer will conduct QA observations of any or all phases of the work. The presence or activity of Engineer observations in no way relieves the Contractor of the responsibility to provide all necessary daily QC inspections of his/her own and to comply with all requirements of this Specification.
2. Hold Points: Work that requires a specific inspection upon completion is designated as a Hold Point. The Contractor shall provide the Engineer with a minimum one-day notification before a Hold Point inspection will be reached. Permission to proceed beyond a Hold Point without a QA inspection will be granted solely at the discretion of the Engineer, and only on a case-by-case basis.
3. The Engineer has the right to reject any work that was performed without adequate provision for QA observations.
4. The Engineer will issue a Non-Conformance Report when work is found to be in violation of the specification requirements, and is not corrected to bring it into compliance before proceeding with the next phase of work.
5. Inspection Access and Lighting

SECTION 09900 - 4 HIGH-PERFORMANCE COATINGS

- a. The Contractor shall facilitate the Engineer's observations as required, including allowing ample time to view the work. The Contractor shall furnish, erect, and move scaffolding or other mechanical equipment to permit close observation of all surfaces to be cleaned and painted. This equipment shall be provided during all phases of the work.
- b. When the surface to be inspected is more than 1.8 m (6 ft) above the ground or water surface, the Contractor shall provide the Engineer with a safety harness and a lifeline according to OSHA regulations.
- c. The Contractor shall provide artificial lighting in areas where natural light is inadequate, as determined by the Engineer, to allow proper cleaning, inspection, and painting. Illumination for inspection shall be at least 325 LUX (30-foot candles). Illumination for cleaning and painting, including the working platforms, access, and entryways shall be at least 215 LUX (20-foot candles).

1.6 SUBSTITUTIONS

- A. Products of manufacturers other than those specified, and equal in type and quality to those specified, may be considered acceptable if said products are offered by the Contractor with satisfactory data on past performance, composition and directions for use. No request for substitution will be approved which decreases the film thickness specified and/or number of coats to be applied, or which offers a change from the generic type of paint and coating system specified.

1.7 DELIVERY, STORAGE AND HANDLING

- A. All paint shall be delivered to the job site in the manufacturer's original, sealed and labeled containers and shall be subject to inspection and approval by the Engineer prior to use.
- B. Shipping
 - 1. Where pre-coated items are to be shipped to the site, protect coating from damage. Batten coated items to prevent abrasion.
 - 2. Use non-metallic or padded slings and straps in handling.
- C. Storage
 - 1. Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.
 - 2. Primed surfaces shall not be exposed to weather for more than two months before being topcoated, or less time if recommended by coating manufacturer.

1.8 SERVICES OF MANUFACTURER

- A. For submerged and severe service coating systems, the Contractor shall require the paint manufacturer to furnish the following services:
 - 1. The manufacturer's representative shall provide technical support to resolve field problems associated with the surface preparation requirements and application and curing of the manufacturer's products.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Provide tenting, dehumidification, heating, and other environmental controls necessary to meet the preparation, application, and curing requirements of the coatings used.

1.10 EXTENDED WARRANTIES

- A. When specified, provide manufacturer's and contractor's extended warranty for materials and workmanship with Owner named as beneficiary, and shall commence at the time of substantial completion.

1.11 PROTECTION OF EXISTING PAINTED STRUCTURES

- A. The painting on existing structures and equipment shall be protected. Any damage caused by the Contractor's operation shall be repaired or restored to a condition equal to or better than before it was damaged.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer used as the basis of design: Product names used herein refer to materials manufactured and/or supplied by Tnemec Co. and are used as the basis of quality for design and bidding.
 - 1. Approved Manufacturers – Paint
 - a. Tnemec
 - b. Sherwin Williams
 - c. or pre-approved "or-equals" in accordance with Instructions to Bidders Article 11 and listed below:
 - i. N/A
- B. All paint materials selected for each coat for each type of surface shall be the product of a single manufacturer. The type of paint material to be used and the number of coats to be applied are listed in the coating systems specified below.

- C. All paint materials and equipment shall be compatible in use. Finish coats shall be compatible with prime coats. Prime coats shall be compatible with the surface to be coated. All tools and equipment shall be compatible with the coating to be applied.
- D. Coal tar epoxy and products containing coal tar pitch will not be allowed.
- E. Special systems as specified for surface conditions by the manufacturer specified; substitution only upon affidavit of alternate manufacturer that product will meet conditions and label for surface use.

2.2 COLORS

- A. Prime coatings shall be contrasting but complimentary to finish coatings.
- B. All colors and glosses shall be as selected by the Owner.
- C. Colors and painting schemes shall match existing colors at project for similar surfaces.

2.3 ABRASIVE MATERIALS

- A. Select abrasive type and size to produce a surface profile that meets coating manufacturer's recommendations.
- B. Abrasive blast cleaning shall be performed using either expendable abrasives (other than silica sand) or recyclable steel grit abrasives. Expendable abrasive shall be used one time and disposed of. Abrasive suppliers shall certify that the expendable abrasives meet the requirements of SSPC-AB1 and that recyclable steel grit abrasives meet AB3. The Contractor shall verify that recycled abrasives meet the requirements of SSPC-AB2 during use. All surfaces prepared with abrasives not meeting the SSPC-AB1, AB2, or AB3 requirements, as applicable, shall be solvent cleaned or low pressure water cleaned as directed by the Engineer, and re-blast cleaned at the Contractor's expense.

2.4 THINNERS, CLEANERS, DRIERS, AND OTHER ADDITIVES

- A. As recommended by manufacturer of the particular coating.

2.5 VISUAL STANDARD

- A. When specified and to facilitate inspection, Contractor shall, on the first day of sandblasting operations, sandblast metal plates to the surface preparation standards specified. Plates shall measure 8½ inches by 6 inches. Plates shall be approved by the Engineer. Plates shall be coated with a clear, non-yellowing finish. One of these plates shall be prepared for each type of sandblasting and shall be used as the comparison standard throughout the project.

PART 3 EXECUTION

3.1 SURFACE PREPARATION, GENERAL

- A. Prior to all surface preparation and painting operations, completely mask, remove or otherwise adequately protect all hardware, accessories, machined surfaces, plates, lighting fixtures, equipment, and similar items in contact with painted surfaces but not scheduled to receive paint.
- B. All surfaces to be painted shall be in the proper condition to receive the specified paint before said paint is applied. Surface preparation shall be done in a workmanlike manner with the objective of obtaining a clean and dry surface. No more surface preparation than can be coated in a normal working day shall be permitted. No coating shall be applied before the prepared surfaces are approved by the Engineer.
- C. Schedule all cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly-painted surfaces.
- D. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.
- E. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. For process piping, mask bolt threads to allow nuts to be removed for maintenance.
- F. Mask openings in motors to prevent paint and other materials from entering the motors.
- G. Protect all surfaces adjacent to or downward of work area from overspray. Contractor shall be responsible for any damage resulting from overspray.

3.2 SURFACE PREPARATION DESIGNATIONS

- A. General:
 - 1. The following designations for surface preparation shall be utilized in the coating systems specified. In no case shall the surface preparation be less than that specified by the Paint Manufacturer. In case of conflict, the more restrictive requirement shall apply.
 - 2. Inspect and provide substrate surfaces prepared in accordance with these Specifications and the printed directions and recommendations of paint manufacturer whose product is to be applied. The more stringent requirements shall apply.
 - 3. Position diesel- or gasoline-powered equipment in a manner to prevent deposition of combustion contaminants on any part of the structure.

4. Do not perform abrasive blast cleaning whenever relative humidity exceeds 85 percent or whenever surface temperature is less than 5 degrees F above dew point of ambient air.
5. Schedule all cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly-painted surfaces.
6. No more surface preparation than can be coated in a normal working day shall be permitted.
7. No coating shall be applied before the prepared surfaces are approved by the Engineer.

- B. Concrete and Masonry: All surfaces shall be cleaned of all dust, mortar splatter, curing compounds, grease and other foreign matter. Surface preparation shall conform to the following table:

CONCRETE AND MASONRY SURFACE PREPARATION	
Designation	Description
C-1	Solvent Cleaning: Solvent cleaning is a method for removing all visible oil, grease, soil, and other soluble contaminants. Low pressure (1500 – 4000 psi) high volume (3-5 gal/min) water washing with appropriate cleaning chemicals.
C-2	Acid Etch: Clean and etch with 10 percent muriatic acid solution, scrub thoroughly, neutralize acid, rinse thoroughly, and allow to dry. If curing compound has been used on concrete, clean curing compound off with solenoid prior to acid etching.
C-3	Abrasive Blasting

- C. Metal: All surfaces shall be cleaned of all rust, scale, dust and other foreign matter. Sharp edges, burrs and weld spatter shall be removed. Surface preparation shall conform to the following table and shall be in accordance with the Steel Structures Painting Council (SSPC).

METAL SURFACE PREPARATION	
Designation	Description
SSPC-SP1	Solvent Cleaning: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Low-pressure (1500 - 4000 psi) high volume (3 - 5 gal/min.) water washing with appropriate cleaning chemicals is a recognized "solvent cleaning" method. All surfaces should be cleaned per this specification prior to using hand tools or blast equipment.
SSPC-SP2	Hand Tool Cleaning: Hand Tool Cleaning removes all loose mill scale, loose rust and other detrimental foreign matter. It is not intended that this process remove adherent mill scale, rust and paint. Mill scale, rust and paint are considered adherent if they cannot be removed by lifting with a dull putty knife. Before hand tool cleaning, remove visible oil, grease, soluble welding residues and salts by the methods outlined in SSPC-SP1.

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METAL SURFACE PREPARATION	
Designation	Description
SSPC-SP3	Power Tool Cleaning: Power Tool Cleaning removes all loose mill scale, loose rust and other detrimental foreign matter. It is not intended that this process remove adherent mill scale, rust and paint. Mill scale, rust and paint are considered adherent if they cannot be removed by lifting with a dull putty knife. Before power tool cleaning, remove visible oil, grease, soluble welding residues and salts by the methods outlined in SSPC-SP1.
SSPC-SP5	White Metal Blast Cleaning: A White Metal Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
SSPC-SP6	Commercial Blast Cleaning: A Commercial Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter, except for staining. Staining shall be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks or minor discoloration caused by stains of rust, stains of mill scale or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
SSPC-SP7	Brush-Off Blast Cleaning: A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust and loose paint. Tightly adherent mill scale, rust and paint may remain on the surface. Mill scale, rust and coating are considered adherent if they cannot be removed by lifting with a dull putty knife after abrasive blast cleaning has been performed. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
SSPC-SP10	Near-White Blast Cleaning: A Near-White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks or minor discoloration caused by stains of rust, stains of mill scale or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
SSPC-SP11	Power Tool Cleaning to Bare Metal: Metallic surfaces that are prepared according to this specification, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products and other foreign matter. Slight residues of rust and paint may be left in the lower portions of pits if the original surface is pitted. Prior to power tool surface preparation, remove visible deposits of oil or grease by any of the methods specified in SSPC-SP1, Solvent Cleaning, or other agreed upon methods.
SSPC-SP13	Surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.
SSPC-SP16	Brush-Off Blast Cleaning of Non-Ferrous Metals SP 16 is intended for brush-off blast cleaning of coated or uncoated metal surfaces other than carbon steel prior to the application of a protective coating system. Surface preparation using this standard

METAL SURFACE PREPARATION	
Designation	Description
	is intended to roughen and clean coated and uncoated non-ferrous metal substrates, including, but not limited to, galvanized surfaces, stainless steel, copper, aluminum, and brass. SP 16 requires the cleaned surface to be free of loose contaminants and loose coating as determined by visual inspection. A minimum surface profile of 19 micrometers (0.75 mil) on the bare metal surface is required. Intact coatings are required to be roughened to the degree specified in the project specification.

- D. Wood: Wood surfaces shall be thoroughly cleaned and free of all foreign matter. Surface preparation shall conform to the following table:

WOOD SURFACE PREPARATION	
Designation	Description
W-1	Clean with mineral spirits, scraping or wire-brushing. Properly fill cracks, nail holes and other defects. Wipe clean of dust.

- E. PVC Pipe: PVC pipe shall be clean and dry. Surface preparation shall conform to the following table:

PVC PIPE SURFACE PREPARATION	
Designation	Description
P-1	Sand lightly and wipe clean with xylol or toluol solvent. Allow to dry completely.

3.3 APPLICATION

A. General

- The application of all coatings shall be in strict accordance with the Manufacturer's Instructions and shall be performed in a manner satisfactory to the Engineer. Painting shall be done at such times as the Contractor and Engineer may agree upon in order that dust-free and neat work be obtained.
- On metal surfaces, each coat shall be applied at the rate specified by the Manufacturer to achieve the dry mil thickness specified herein. If material has thickened or must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material. Deficiencies in film thickness shall be corrected by the application of additional coats of paint.
- On masonry or wood, application rates will vary according to surface texture; however, in no case shall the Manufacturer's stated coverage rate be exceeded. On porous surfaces, it shall be the Contractor's responsibility to achieve a protective and decorative finish, either by decreasing the coverage rate or by applying additional coats of paint.
- Additional coats of paint shall not be applied until the preceding coat has dried as evidenced by tests with a moisture meter. Drying time shall be construed to

mean an interval under normal conditions and shall be increased to allow for adverse weather or drying conditions.

5. Thinning, when required, shall be done in strict accordance with the Manufacturer's recommendations using the Manufacturer's thinner, or that recommended by the Manufacturer, with knowledge and approval of the Engineer.
6. Use skilled craftsmen and experienced supervision.
7. Apply coating to produce an even film of uniform thickness. Give special attention to edges, corners, crevices, and joints. Ensure thorough cleaning and an adequate thickness of coating material. Apply coatings to produce finished surfaces free from runs, drips, ridges, waves, laps, brush marks, and variations in color, texture, and finish. Effect complete hiding so that the addition of another coat would not increase the hiding. Give special attention to ensure that edges, corners, crevices, welds, and similar areas receive a film thickness equivalent to adjacent areas. Apply a brushed stripe coat to all edges and welds after priming submerged or severe service areas.
8. Coordinate cleaning and coating so that dust and other contaminants from the cleaning process will not fall on wet, newly-coated surfaces.
9. Prime surfaces within 12 hours after they are blasted. Re-blast surfaces that have started to rust before they are painted.
10. No paint shall be applied in fog, snow, rain, or to wet or damp surfaces or when air temperatures are below 40 degrees F.
11. Surface temperature shall be at least 5 degrees F above the dew point during final surface preparation and painting.
12. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
13. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
14. On pipelines, terminate coatings along pipe runs to one inch inside pipe penetrations.
15. Keep paint materials sealed when not in use.
16. Where more than one coat of a material is applied within a given system, alternate color to provide a visual reference that the required number of coats have been applied.
17. The Contractor shall be responsible for ensuring that the shop prime coating is compatible with the finish coating. Materials and application as specified herein shall govern regardless of whether coatings are factory-applied or field-applied. After installation, any damaged areas in prime or finish coatings shall be repaired as directed by the Engineer.

B. Stripe Coating

1. Stripe coat all field welds, edges, angles, fasteners, and other irregular surfaces.
2. Stripe coat shall consist of one coat, brush applied, to the coating thickness specified.
3. Apply stripe coat between primer and intermediate coats.
4. Stripe coat color shall contrast with prime coat to allow visual verification of application.

3.4 FACTORY-APPLIED COATINGS AND TOUCH-UP

- A. Except where factory or shop application of finish coatings is permitted elsewhere in these Specifications, or by the Engineer in writing, all items shall be finish-painted after installation with the color selected or approved by the Engineer. Shop priming shall be permitted in all cases. The Contractor shall be responsible for insuring that the shop prime coating is compatible with the finish coating. Materials and application as specified herein shall govern regardless of whether coatings are factory-applied or field-applied. After installation, any damaged areas in prime or finish coatings shall be repaired as directed by the Engineer.

3.5 INSPECTION

- A. Do not apply additional coats until completed coat has been inspected and approved by the Engineer. Only inspected and approved coats of paint shall be considered in determining the number of coats applied.

3.6 CLEANUP

- A. Prevent accidental spilling of paint materials and, in the event of such a spill, immediately remove all spilled material and the waste or other equipment used to clean up the spill, and wash the surfaces to their original, undamaged condition.
- B. Upon completion of painting, visually inspect all surfaces and remove all paint and traces of paint from surfaces not specified to be painted.

3.7 QUALITY CONTROL TESTING

- A. Contractor shall perform and document quality control testing as specified for each coating system.
1. Level 1 – Minimum required QC test requirements for all painting and coating:
 - a. Weather conditions – every four hours
 - b. Ambient temperatures – every four hours
 - c. Surface temperature – every four hours
 - d. Wet film thickness – every ½ hour

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2. Level 2 – Testing requirements in addition to Level 1 requirements:
 - a. Continuous ambient temperature (recording thermometer)
 - b. Relative humidity – every four hours
 - c. Dew point – every four hours
 - d. Compressed air cleanliness – prior to using compressed air for abrasive blast cleaning, blowing down the surfaces, and painting with conventional spray, the Contractor shall verify that the compressed air is free of moisture and oil contamination according to the requirements of ASTM D4285. The tests shall be conducted at least one time each shift for each compressor system in operation. If air contamination is evident, the Contractor shall change filters, clean traps, add moisture separators or filters, or make other adjustments as necessary to achieve clean, dry air. The Contractor shall also examine the work performed since the last acceptable test for evidence of defects or contamination caused by the compressed air. Affected work shall be repaired at the Contractor's expense.
 - e. Blast pressure at nozzle – every four hours
 - f. Visual standard for abrasive blast cleaning
 - g. Surface profile – every four hours
 - h. Surface pH of concrete surfaces
 - i. Dry film thickness with magnetic dry film thickness gauge
 - j. Holiday testing by high voltage discontinuity (spark) testing – entire surface

3.8 COATING SYSTEMS

- A. **General:** Surface preparation, prime coatings and finish coatings for the various surfaces and items to be painted are specified below. Prime coatings shall be contrasting but complimentary to finish coat.

- B. **Exterior Metal and Piping, Non-Submerged:** Includes, but not limited to, machinery, structural steel beams, columns, bracing, open web steel bar joists, and ancillary structural elements, pumps, pipe hangers, ductile iron pipe, cast iron pipe, galvanized steel pipe, copper pipe, fabrications, PVC pipe, and electrical conduit; *excludes others specifically noted or specified elsewhere*. "Non-submerged" is defined as those items located one (1) foot or more above the maximum water level.

Surface Preparation	
a. Bare Metal (Steel)	SSPC-SP6 or as approved by the Engineer
b. Primed Metal and Ductile or Cast Iron	SSPC-SP1 and SSPC-SP7 (or SP3)
Generic Type	Primer. Epoxy-Polyamide Finish. Acrylic Polyurethane
Primer	Tnemec Series 66 Hi-Build Epoxoline, 3.0 to 4.0 MDFT. Stripe coat shall be used as necessary to insure proper dry film thickness and a pin-hole free surface.
Finish Coat	Tnemec Series 73 Endura-Shield, Semi-gloss, 2.0 to 5.0 MDFT. Stripe coat shall be used as necessary to insure proper dry film thickness and a pin-hole free surface.
Quality Control	Level 1 and 2
Extended Warranty	Three (3) Years. At the completion of the work, stencil the date on the structure/machine in 2-inch-high capital letters containing the following wording: "PAINTED (insert month and year in which painting was completed)".

- C. **Interior Metal and Piping:** Includes, but not limited to, machinery, structural steel beams, columns, bracing, open web steel bar joists, and ancillary structural elements, pumps, pipe hangers, ductile iron pipe, cast iron pipe, galvanized steel pipe, copper pipe, fabrications, PVC pipe, and electrical conduit ; *excludes others specifically noted or specified elsewhere. SEE NOTES 1 and 2 below.*

Surface Preparation	
a. Bare Metal (Steel)	SSPC-SP6
b. Primed Metal and Ductile or Cast Iron	SSPC-SP1 and SSPC-SP7 (or SP3)
c. Galvanized Metal	SSPC-SP1 and SSPC-SP3
d. PVC	P-1
e.	All bituminous coated metals shall be sealed prior to the application of the prime coat to prevent bleeding. Sealer shall be compatible with other coatings.
Generic Type	<i>Primer.</i> Polyamide epoxy and/or required for existing finish <i>Stripe Coat.</i> Polyamide epoxy <i>Finish.</i> Polyamide epoxy
Primer	Tnemec Series 66 Hi-Build Epoxoline, 3.0 to 4.0 MDFT
Stripe Coat	Tnemec Series 66 Hi-Build Epoxoline, 3.0 to 4.0 MDFT. Stripe coat shall be used as necessary to insure proper dry film thickness and a pin-hole free surface as necessary.
Finish Coat	Tnemec Series 66 Hi-Build Epoxoline, 3.0 to 4.0 MDFT
Quality Control	Level 1 and 2
Extended Warranty	Three (3) Years. At the completion of the work, stencil the date on the structure/machine in 2-inch-high capital letters containing the following wording: "PAINTED (insert month and year in which painting was completed)".

1. STRUCTURAL STEEL fabrications and elements that are not Factory Shop-Coated in conformance with this specification with Primer, Stripe and Finish Coats shall be prepared and field coated (or shop coated) per this specification prior to erection on-site. Following erection of structural steel elements, coatings shall be touched-up in the field to repair damaged areas per this specification.
2. NOTE: Bar joist factory hold priming and dip priming shall not be considered in conformance with this specification and shall be removed and re-coated per these specifications on-site or at Contractors facility.

- D. **Submerged and Intermittently Submerged Metal:** “Submerged” is defined as all items below one (1) foot above the maximum water level, including submerged elements. Also includes all metal surfaces, structural steel, and metal fabrications in proximity noted above.

Surface Preparation	<i>Bare Metal.</i> SSPC-SP10 <i>Primed Metal.</i> SSPC-SP1 and SSPC-SP3, scarify the surface
Generic Type	<i>Primer.</i> Epoxy-Polyamide <i>Finish.</i> Polyamidoamine Epoxy
Primer	Tnemec Series 66 Hi-Build Epoxoline, 3.0 to 5.0 MDFT
Finish Coat	Two (2) coats Tnemec Series 69 Hi Build Epoxoline II, 8.0 to 10.0 MDFT/coat. Stripe coat shall be used as necessary to insure proper dry film thickness and a pin-hole free surface.
Quality Control	Level 1 and 2
Extended Warranty	Three (3) Years. At the completion of the work, stencil the date on the structure/ machine in 2-inch-high capital letters containing the following wording: “PAINTED (insert month and year in which painting was completed)”.

- E. **Metal, Concrete Encased:** All metal surfaces, encased in concrete, such as pipes, wall pipes, thimbles, pipe sleeves, gate guides. Excludes reinforcing steel, stainless steel, and galvanized metals.

Surface Preparation	SSPC-SP6
Generic Type	Polyamidoamine Epoxy
Coating	Two (2) coats Tnemec Series 69 H1-Build Epoxoline II, 8.0 to 10.0 MDFT/coat. Stripe coat shall be used as necessary to insure proper dry film thickness and a pin-hole free surface.
Quality Control	Level 1 and 2
Extended Warranty	None

- F. **Aluminum in Contact with Concrete:**

Surface Preparation	SSPC-SP1 and SSPC-SP16 (Scarify, degloss and provide 1 mil profile)
Generic Type	Polyamidoamine Epoxy
Coating	Tnemec Series N69 H1-Build Epoxoline II, 6 to 8 MDFT. Stripe coat shall be used to insure proper coverage on all sharp edges.
Quality Control	Level 1
Extended Warranty	None

G. **Architectural Finishes Including:** (see Section 09910 Architectural Paints and Coatings):

1. Gypsum Wall Board
2. Siding and Trim (interior and exterior)
3. Concrete Masonry Units - CMU (interior and exterior)
4. Exterior and Interior Metal Doors and Frames

3.9 PIPING COLOR CODE AND IDENTIFICATION

- A. General: Unless required otherwise by the Engineer, all exposed process and building piping and accessories shall be identified as specified herein. Bronze, copper, brass, glass, and chrome-plated piping need not be painted with the basic identification color except for color bands to serve as the background for the legends. Arrows shall be installed at 15-foot intervals on all pipe indicating direction of flow and at all wall and floor penetrations. The entire exposed surface of all other piping and accessories shall be painted according to the color codes indicated in the pipe schedule.
- B. Identification: Identify all exposed piping and all piping on each side of each valve; on each side of a takeoff and on the takeoff; adjacent to each penetration and not more than 15 feet on center. Identify piping with name of service as shown on Plans with block letters neatly stenciled on the finished insulation or pipe with flat enamel of the color indicated in the schedule above. Use no abbreviations. Position identification so that it is readily visible from eye level. All chemical piping shall be identified a minimum of two (2) times in each interior room.

SIZE OF LETTERS

Outside Diameter of Pipe or Covering	Height of Stencil Letter
¾" to 1¼"	½"
1½" to 2"	¾"
2½" to 6"	1¼"
8" to 10"	2½"
Over 10"	3½"

END OF SECTION

Paint Inspection: Daily Coating Inspection Report

Project/Client:					Date: / / M T W Th F S Su					Pg. Of	
Location:					Project #:					COPY To:	
Description:					Inspector:					☐ QC Mgr ☐ Owner ☐ Contr ☐ _____	
Requirements:										Attachments:	
Contractor:										☐ DFT Sheet ☐ NCR/CAR ☐ _____	
Spec #					Revision #						
Description of Areas & Work Performed					Hold Point Inspections Performed						
					☐ 1 Pre Surface Prep/Condition & Cleanliness ☐ 2 Surface Preparation Monitoring ☐ 3 Post Surface Preparation/Cleanliness & Profile ☐ 4 Pre Application Prep/Surface Cleanliness ☐ 5 Application Monitoring/Wet Film Thickness (WFT) ☐ 6 Post Application/Application Defects ☐ 7 Post Cure/Dry Film Thickness (DFT) ☐ 8 Nonconformance/Corrective Actions Follow-up ☐ 9 Final Inspection Approved By: _____						
Surface Conditions					Ambient Conditions						
☐ New ☐ Maint ☐ Primer/Paint ☐ Age/Dry/Cure _____ ☐ Steel ☐ Galvanize ☐ Concrete ☐ Other _____ ☐ Hazard _____ ☐ Sample Report # _____ ☐ Degree of contamination: _____ Test: ☐ Cl _____ $\mu\text{g}/\text{cm}^2$ / ppm ☐ Fe _____ ppm ☐ pH _____ ☐ Degree of Corrosion: _____ ☐ Scale ☐ Pitting/Holes ☐ Crevices ☐ Sharp Edges ☐ Weld _____ ☐ Moisture ☐ Oils ☐ Other _____ ☐ Painted Surface Condition: _____ Dry to: ☐ Touch ☐ Handle ☐ Recoat ☐ Dry/Over Spray ☐ Runs/Sags ☐ Pinholes ☐ Holidays ☐ Abrasion ☐ Fall Out ☐ Other _____					Time (Indicate AM or PM) : : : : Dry Bulb Temp ^o (C/F) : : : : Wet Bulb Temp ^o (C/F) : : : : % Relative Humidity % % % % Surface Temp ^o (C/F) Min/Max / : / : / : / : Dew Point Temp ^o (C/F) : : : : Wind Direction/Speed Weather Conditions:						
Surface Preparation					Application						
Start Time: Finish Time: Est Sq/ft: ☐ Solvent Clean ☐ Hand Tool ☐ Power Tool ☐ HP Wash PSI _____ ☐ Other _____ ☐ Abrasive Blast ☐ Abrasive Type _____ ☐ Sample ☐ Blast Hose Size _____ ☐ Nozzle Size / PSI _____ ☐ Air Supply CFM _____ ☐ Air Supply Cleanliness ☐ Water/Oil Trap Check ☐ Equipment Condition Check					Start Time : Finish Time : Est. Sq/ft. ☐ Primer ☐ Intermediate ☐ Topcoat ☐ Touch-up Generic Type: Qty Mixed: Manuf.: Mix Ratio: Prod Name: Mix Method: Prod #: Strain/Screen: Color: Material Temp: °F Kit Sz/Cond.: Sweat-in Time: Min/Hrs Shelf Life: Pot Life: Min/Hrs Batch #'s (A) Reducer #: Qty Added: Pt/Oz/Gal (B) % by Vol: % (C) Specified WFT Avg: Mils Achieved WFT Avg: Mils ☐ Airless/Conv. Spray ☐ Brush ☐ Roller ☐ Other _____ Pump Pot Hose Dia. Air Check Ratio/Size Hose Lng. SEP/Trap GPM/CFM Spray Gun Filter PSI Tip Sz. Agitator						
Surface Cleanliness & Profile Measurement											
☐ Job Specification ☐ SSPC/NACE - SP- _____ ☐ SSPC/NACE Spec / Visual Stds ☐ _____ Profile Check: _____ ☐ Disc ☐ Tape ☐ Gauge ☐ Specified _____ mils avg. / Achieved _____ mils ☐ Surface effect on DFT Gauge/BMR _____ mils											
Dry Film Thickness											
Gage Type / Model	Gage Serial #	Gage Calib. Verified	Spec Avg. DFT	Total Avg DFT	DFT Last Coat	DFT This Coat					
							Inspector's Signature Date				

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SECTION 09910
ARCHITECTURAL PAINTS AND COATINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Provide all labor, materials, tools and other equipment, services and supervision required to complete all non-immersion, exterior and interior painting and coatings as indicated in the Finish Schedule and to the full extent of the drawings and specifications.
- B. Surface preparation and field painting of exposed Architectural exterior and interior items and surfaces.
- C. Surface preparation and field painting of existing metal door frames, doors and sectional overhead doors.
- D. If there is a conflict with other specifications sections, the most stringent shall apply. Architectural and Engineer approval required.

1.02 RELATED SECTIONS

- A. Section 08110 – Metal Doors and Frames
- B. Section 09900 – High Performance Coatings
 - 1. Reference and coat/paint per Section 09900 for any areas not specified on the Architectural Finish Schedule, including, but not limited to; all process piping, wet wells, tanks, basins and equipment.

1.03 REFERENCES

- A. ANSI A13.1 - Scheme for the Identification of Piping Systems.
- B. ANSI Z535.1 - Safety Color Code.
- C. ASTM D 16 - Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
- D. ASTM D 3359 - Standard Test Methods for Measuring Adhesion by Tape Test.
- E. ASTM D 1653 - Standard Test Methods for Water Vapor Transmission of Organic Coating Films.
- F. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
- G. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.

- H. 40 CFR 59, Subpart D National Volatile Organic Compound Emission Standards for Architectural Coatings.
- I. Fed Spec - TT C-555B - Wind Driven Rain Test.
- J. ASTM D 16- Standard Terminology for Paint, Coatings, Materials, and Applications.
- K. SSPC, The Society for Protective Coatings - Web Site <http://www.sspc.org>
 - 1. SSPC-SP 13/NACE No.6: Surface Preparation of Concrete
 - 2. SSPC-PA 2: Measurement of Dry Coating Thickness with Magnetic Gages
- L. ICRI, The International Concrete Repair Institute – Web Site <http://www.icri.org>
 - 1. Guideline No. 310.2R-2013: Selecting and specifying concrete surface preparation for sealers, coatings, polymer overlays, and concrete repair.
- M. PDCA Paint and Decorating Contractors of America - Web Site <http://www.pdca.org>:
 - 1. PDCA Standards P1 through P15.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300 – Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Finish Schedule: Submit finish schedule including color information, gloss and model number for each type and color of finish specified noting the location (rooms, item, etc.) that the paint or coating will be applied.
- D. Verification Samples: Submit 8" x 10" drawdown samples for each finish product specified.
 - 1. Two samples minimum.
 - 2. Representing actual product, color, and sheen.
 - 3. Label with project and product specific information.
- E. System Application Process (for each coating system):
 - 1. Contractor shall indicate surface preparation, primer, stipe coat, finish coat for each paint system.
 - 2. Submittal shall be approved by the coating manufacturer, the applicator and the General Contractor that is specific to each application system.
- F. Quality Control:
 - 1. Certifications specified in the following Quality Assurance article.
 - 2. If the manufacturer of finish coating differs from that of the shop primer, provide both manufacturers' written confirmation that materials are compatible.
 - 3. Manufacturer's written verification that submitted material is suitable for the intended use.

- G. Quality Assurance Site Mock-Ups as required located in Quality Assurance Article.
- H. Closeout Data / O&M Manual (Section 01700):
 - 1. Finish Schedule. Schedule that list paint types and locations.
 - 2. Maintenance Data
 - 3. Warranty

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All paint materials selected for each system for each type of surface shall be supplied by a single manufacturer with a minimum of ten (10) years of experience.
- B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing finishes and coatings of the same type and scope as specified.

1.06 QUALITY CONTROL

- A. See Article 3.01 – Inspections

1.07 SUBSTITUTIONS

- A. Products of manufacturers other than those specified, and equal in type and quality to those specified, may be considered acceptable if said products are offered by the Contractor with satisfactory data on past performance, composition and directions for use. No request for substitution will be approved which decreases the film thickness specified and/or number of coats to be applied, or which offers a change from type of paint and coating system specified.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Take special safety precautions against hazards from toxic and flammable materials.
- D. Place paint and solvent contaminated cloths and materials, subject to spontaneous combustion, in containers and remove from job site each day.
- E. Keep open flame, electrical and static spark, and other ignition sources from flammable vapors and materials at all times.
- F. Store products in protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.

1.09 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Post "WET PAINT" signs during application and curing of all coatings that may be accessed by other trades or the public.
- C. Post "NO SMOKING" signs during application and curing of solvent-based materials.

1.10 WARRANTY

- A. The Contractor shall provide a Manufacturer's guarantee to warrant the materials to be free from defects for a period of two (2) years from the Date of Substantial Completion and in accordance with the General Conditions.
- B. The installation Contractor shall warrant the materials and workmanship to be free of defects in workmanship for a period of two (2) years from the Date of Substantial Completion and in accordance with General Conditions.
- C. At project closeout, provide to Owner or Owner's Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

1.11 EXTRA MATERIALS

- A. At project closeout, provide to the Owner or Owner's representative, two gallons (7.75L) of each finish coating material in sealed 1 gallon (3.875 L) containers, clearly marked with color, finish identification, date and location(s) applied.
- B. Custom Colors: Provide a list of color formula and location for each finish specified.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufactures used as the basis of design. Paint and Coatings specified within this section are by:

(SW) Sherwin Williams: 101 Prospect Avenue NW, Cleveland, OH 44115
www.sherwin-williams.com
- B. Subject to compliance with all requirements within this section, equivalent products by following manufacturers are acceptable.

2.02 PAINT MATERIALS – GENERAL

- A. VOC : Provide materials to meet EPA 40 CFR Part 59 (AD-FRL-6149-71] RIN 2060 - National Volatile Organic Compound Emission Standards for Architectural Coatings, Final Rule, Federal Register / Vol. 63, No.176, September 11, 1998/Rules and Regulations.
- B. All paint materials and equipment shall be compatible in use. Finish coats shall be compatible with prime coats. Prime coats shall be compatible with the surface to be coated. All tools and equipment shall be compatible with the coating to be applied.

2.03 PAINT SYSTEM KEY

A. Exposure:

Code	Environment
INT	Interior
EXT	Exterior

B. Substrate:

Code	Substrate Material
MFR	Manufacturer's Factory Finish
PLY	Plywood
T	Trim (Composite or Wood as specified)
W	Wood/Lumber/Timber

2.04 EXTERIOR PAINT SYSTEMS (EXT)

A. Exterior Metal (S):

EXT-S-1:

Substrate: Ferrous Metal, Galvanized factory Primer: New and Existing Metal Door Frames, Metal Vision Lite Frames and Doors. Required Coating System Requirements: Highly resistant to; abrasion, brief chemical contact, wet conditions, weathering, long term color and gloss retention.

- a. **Primer:** To be completed by door manufacture. See Section 08110 – Metal Doors and Frames.
- b. **Tie-Coat/Primer:** Prime over factory primed galvanized metal base. See Section 08110 – Metal Doors and Frames.
 - i. **(SW)** One coat of Macropoxy 646FC (Polyamide Epoxy)
 - ii. 3.0 to 5.0 mils DFT per coat
- c. **Finish:** Semi-Gloss
 - i. **(SW)** Two coats of Acrolon Ultra (Acrylic Aliphatic Polyurethane)
 - ii. 2.0 to 3.0 mils DFT per coat

EXT-S-2:

Substrate: Ferrous Metal Structural Steel: Wet, high humidity such as exterior exposed structural columns, beam supports/brackets. See Drawings Sheet S-921. Required Coating System Requirements: Highly resistant to; abrasion, wet conditions, weathering, long term color and gloss retention.

- a. Typical Surface Preparation: SP3
- b. **Primer:** Ferrous Metal Surfaces – Prime exposed metal areas with
 - i. **(SW)** One coat of Corothane I Mio-Zinc Primer (Aromatic Polyurethane Primer)
 - ii. 3.0 – 4.0 mils DFT per coat
- c. **Finish:** Semi-Gloss
 - i. **(SW)** Two coats of Acrolon Ultra (Acrylic Aliphatic Urethane)
 - ii. 2.0 to 3.0 mils DFT per coat

B. Exterior Wood (W):**EXT-W-1**

Substrate: Wood/Timber

- a. Base Coat:
 - i. One coat of Sikkens Proluxe Cetol 1 RE Premium, translucent Exterior wood basecoat
 - Translucent Iron Oxide Pigments – Improved clarity and color retention; protection from graying.
 - Superior UV Protection
 - Highly Transparent
 - Water Repellent
 - Weather Resistant
 - Flexible
- b. Finish Coat:
 - i. Two coats of Sikkens Proluxe Cetol 23 Plus RE, Premium, translucent exterior wood finish
 - Alkyd Resin
 - Superior UV Protection
 - Excellent color retention.

2.05 INTERIOR PAINT SYSTEMS (INT)**A. Interior Metal (S)****INT-S-1:**

Substrate: Ferrous Metal, Galvanized factory Primer: New and Existing Metal Door Frames, Metal Vision Lite Frames and Doors. Required Coating System Requirements: Highly resistant to; abrasion, brief chemical contact, wet conditions, weathering, long term color and gloss retention.

- a. **Primer:** To be completed by door manufacture. See Section 08110 – Metal Doors

and Frames.

- b. **Tie-Coat/Primer:** Prime over factory primed galvanized metal base. See Section 08110 – Metal Doors and Frames.
 - i. **(SW)** One coat of Macropoxy 646FC (Polyamide Epoxy)
 - ii. 3.0 to 5.0 mils DFT per coat
- c. **Finish:** Semi-Gloss
 - i. **(SW)** Two coats of Acrolon Ultra (Acrylic Aliphatic Polyurethane)
 - ii. 2.0 to 3.0 mils DFT per coat

B. Interior Masonry (CMU)

INT-CMU-1:

Substrate: Concrete Masonry Units (CMU), Porous.

- a. See Section 07191 – Vertical Wall Water Repellent (WR1)

D. Interior Plywood (PLY):

INT-PLY-1:

Substrate: Plywood.

- a. **Filler:** Fill joints, cracks, screw holes, open knot holes, etc.
 - i. See Section 07920 – Joint Sealants, Type 5.
- b. **Primer:**
 - i. **(SW)** One coat of PrepRite ProBlock Interior Latex Primer/Sealer
 - ii. 1.0 – 1.5 mils DFT per coat
- c. **Finish:** Low Semi-Gloss
 - i. **(SW)** Two coats of Pro Industrial Pre-Catalyzed Waterbased Epoxy
 - ii. 1.2 – 1.8 mils DFT per coat

E. Interior Composite Trim (T):

INT-T-1:

Substrate: Composite Trim (interior).

- a. **Filler:** Fill joints, cracks, screw holes, open knot holes, etc.
 - i. See Section 07920 – Joint Sealants, Type 4.
- b. **Primer:**
 - i. **(SW)** One coat of PrepRite ProBlock Interior Latex Primer/Sealer
 - ii. 1.0 – 1.5 mils DFT per coat
- c. **Finish:** Low Semi-Gloss
 - i. **(SW)** Two coats of Pro Industrial Pre-Catalyzed Waterbased Epoxy
 - ii. 1.2 – 1.8 mils DFT per coat

PART 3 - EXECUTION

3.01 INSPECTION

- A. The Contractor shall be responsible for Quality Control (QC) required to ensure the Work

meets the requirements shown on the drawings and described in this Specification, including the required surface preparation.

- B. All work performed under this section shall be carefully inspected by Contractor and Engineer/Architect for rejections or flaws to be corrected, and for proper compliance with plans and specifications.
- C. Visual Inspection: The paint systems will be visually inspected by the Engineer/Architect. Show-through of substrate or previous coating will be grounds for rejection.
- J. Painted exterior and interior surfaces shall be considered to lack uniformity or soundness if any of the following, but not limited to, defects are apparent to the Engineer/Architect:
 - 1. Brush/roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coating.
 - 2. Evidence of poor or complete lack of coverage at indents, air pockets/bugholes in concrete, plate edges, lap joint, crevices, pockets, corners and reentrant angles.
 - 3. Damage due to touching before paint is sufficiently dry or any other contributory cause.
 - 4. Damage due to application on moist surfaces or caused by inadequate protection from the weather.
 - 5. Damage and/or contamination of paint due to blown contaminants (dust, spray paint, debris, etc.)
- K. Painted surfaces shall be considered unacceptable if any of the following are evident under natural lighting source for exterior and final lighting source (including daylight) for interior surfaces:
 - 1. Visible defect are evident on horizontal or vertical surfaces when viewed at normal viewing angles from a distance of not less than 39'.
 - 2. Visible defects are evident on ceiling and other overhead surfaces when viewed at normal viewing angles.
 - 3. When the final coat on any surface exhibits a lack of uniformity of color, sheen, texture and hiding across full surface area.
- L. Painted surfaces rejected by the Engineer/Architect shall be made good at the expense of the Contractor.

3.02 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Ensure that surfaces to receive coatings are dry immediately prior to application.
- C. Ensure that moisture-retaining substrates to receive coatings have moisture content within tolerances allowed by coating manufacturer. Where exceeding the following values, promptly notify Architect and obtain direction before beginning work.
 - 1. Interior Wood: 15 percent, measured in accordance with ASTM D-2016.
 - 2. Exterior Wood: 15 percent, measured in accordance with ASTM D-2016

- 3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
- D. Examine surfaces to receive coatings for surface imperfections and contaminants that could impair performance or appearance of coatings, including but not limited to, loose primer, sawdust, wood splinters, mildew, algae, or fungus, stains or marks, cracks, indentations, or abrasions.
- E. Correct conditions that could impair performance or appearance of coatings in accordance with specified surface preparation procedures before proceeding with coating application.

3.03 PREPARATION – GENERAL

- A. Installer must examine the areas and conditions under which painting work is to be applied. Notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
 - 1. Test previously painted or primed surfaces for compatibility with painting systems.
- B. Clean surfaces thoroughly prior to coating application.
- C. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.
- D. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; cover stains and marks which cannot be completely removed with isolating primer or sealer recommended by coating manufacturer to prevent bleed-through.
- E. Remove dust and loose particulate matter from surfaces to receive coatings immediately prior to coating application.
- F. Protect adjacent surfaces not indicated to receive coatings.
- G. Prepare substrate surfaces in accordance with these specification and the manufacturer's instructions for specified coatings and indicated materials. The more stringent requirements shall apply.
- H. Provide tenting, dehumidification, heating, and other environmental controls necessary to meet the manufacturer's preparation, application and curing requirements of the coating used.

3.04 SURFACE PREPARATION

- A. Masonry Surfaces: Power wash completed cmu surfaces to remove loose particles, sand, efflorescence, laitance, cleaning compounds and other substances that could impair coating performance or appearance. Refer to coating manufactures preparation and coating instructions.

1. Allow new cmu wall to dry/cure a minimum of 5-7 days. Test clean small area prior to entire building cleaning.
 2. Clean masonry surfaces when temperature is above 40° F. Do not clean when temperatures are below freezing or will be overnight.
 3. Determine alkalinity and moisture content of the surfaces to be painted by performing appropriate tests. Do not paint over surfaces where the alkalinity or moisture content exceeds that permitted in the manufacturer's printed instructions.
- B. General Metal Surface Preparation: All workmanship for metal surface preparation shall be in conformance with the current Steel Structures Painting Council (SSPC) specifications listed below. All oil, grease, welding fluxes, and other surface contaminants shall be removed prior to blast cleaning. All surfaces shall be cleaned of all dust and residual particles of the blast cleaning operations prior to painting. Surfaces that have started to rust before they are painted shall be re-blasted.

SSPC-SP1: Solvent Cleaning

Solvent Cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process.

- C. Hot dip galvanized items shall not be painted (except hollow metal door frames and doors) except where directed or called for in the specifications and/or drawings.
- D. Sand metal lightly between coats to achieve required finish.

3.05 APPLICATION – GENERAL

- A. All coating systems shall be applied and cured prior to surface mounting conduits, equipment, prefinished items, etc. to the walls or ceiling. The wall and ceiling paint system(s) shall be continuous. No wood surface shall be left exposed whether exposed or concealed, all wood surfaces to be painted.
- B. Apply each coat to uniform coating thickness in accordance with manufacturer's instructions and submittals, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, sags, runs, roller marks, orange-peel, or other application imperfections are not permitted.
- C. On metal surfaces, each coat shall be applied at the rate specified by the Manufacturer to achieve the dry mil thickness specified herein. If material has thickened or must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material. Deficiencies in film thickness shall be corrected by the application of additional coats of paint.
- D. On masonry or wood, application rates will vary according to surface texture; however, in no case shall the Manufacturer's stated coverage rate be exceeded. On porous surfaces, it shall be the Contractor's responsibility to achieve a protective and decorative finish, either

by decreasing the coverage rate or by applying additional coats of paint.

- E. Additional coats of paint shall not be applied until the preceding coat has dried as evidenced by tests with a moisture meter. Drying time shall be construed to mean an interval under normal conditions and shall be increased to allow for adverse weather or drying conditions.
- F. Thinning, when required, shall be done in strict accordance with the Manufacturer's recommendations using the Manufacturer's thinner, or that recommended by the Manufacturer, with knowledge and approval of the Architect.
- G. Inspect each coat before applying next coat; touch-up surface imperfections with coating material, feathering, and sanding if required; touch-up areas to achieve flat, uniform surface without surface defects visible from 5 feet (1.5 m).
- H. Remove dust and other foreign materials from substrate immediately prior to applying each coat.
- I. Coordinate cleaning and coating so that dust and other contaminants from the cleaning process will not fall on wet, newly-coated surfaces.
- J. Where coating application abuts other materials or other coating color, terminate coating with a clean sharp termination line without coating overlap.
- K. Where color changes occur between adjoining spaces, through framed openings that are of same color as adjoining surfaces, change color at outside stop corner nearest to face of closed door.
- L. Re-prepare and re-coat unsatisfactory finishes; refinish entire area to corners or other natural terminations.
- M. Predrill holes prior to applying base and finish coats. If holes are drilled in the field after coatings, field touch up holes prior to installing fasteners.
- N. Apply paint to surfaces behind moveable or fixed equipment, conduits, etc. the same as similar exposed surfaces.
- O. Repair of defective work: Where any painted surface exhibits rust through its finished coat, all layers of primer and paint shall be removed down to the bare metal. The metal surface shall be prepared again to receive a completely new paint system. The new system shall be the same as the one removed or as selected by Architect. No credit for coat applied will be given, and Contractor assumes recoat responsibilities.
- P. Apply coating to produce an even film of uniform thickness. Give special attention to edges, corners, crevices and joints.
- Q. Stripe Coating
 - 1. Stripe coat all field welds, edges, angels, fasteners, and other irregular surfaces.

2. Stripe coat shall consist of one coat, brush applied, to the coating thickness specified, min. 2-4 DFT.
 3. Apply stripe coat between primer and intermediate coats.
 4. Stripe coat color shall contrast with prime coat to allow visual verification of application.
- R. No paint shall be applied in fog, snow, rain or to wet or damp surfaces or when air temperatures are below 40° F or can be the lowest temp during its drying time.
 - S. Surface temperature shall be at least 5° F above the dew point during final surface preparation and painting.
 - T. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
 - U. Where more than one coat of a material is applied within a given system, alternate color to provide a visual reference that the required number of coats have been applied.
 - V. Prime and paint metal doors prior to installation of any door hardware. All surfaces of door shall be coated with primer, including tops and bottoms of doors. Finish painting shall be completed at all door edges and faces prior to installation of door hardware.

3.06 FACTORY-APPLIED COATINGS AND TOUCH-UP

- A. Except where factory or shop application of finish coatings is permitted elsewhere in these Specifications, or by the Architect in writing, all items shall be finish-painted after installation with the color selected or approved by the Architect. Shop priming shall be permitted in all cases. The Contractor shall be responsible for insuring that the shop prime coating is compatible with the finish coating. Materials and application as specified herein shall govern regardless of whether coatings are factory-applied or field-applied. After installation, any damaged areas in prime or finish coatings shall be repaired as directed by the Architect.

3.07 CLEANING

- A. Clean excess coating materials, and coating materials deposited on surfaces not indicated to receive coatings, as construction activities of this section progress; do not allow to dry.
- B. Upon completion of paint work, clean all window glass, frames and other surfaces. Clean by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- C. Re-install hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items that have been removed to protect from contact with coatings.
- D. Reconnect equipment adjacent to surfaces indicated to receive coatings.

- E. Relocate to original position equipment and fixtures that have been moved to allow application of coatings.
- F. Remove protective materials.

3.08 PROTECTION

- A. Protect completed coating applications from damage by subsequent construction activities.
- B. Repair to Architect's acceptance coatings damaged by subsequent construction activities. Where repairs cannot be made to Architect's acceptance, re-apply finish coating to nearest adjacent change of surface plane, in both horizontal and vertical directions.

END OF SECTION

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**SECTION 10520
FIRE PROTECTION**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section includes the following:
 - 1. Fire extinguishers.
 - 2. Fire extinguisher mounting brackets
 - 3. Fire Extinguisher wall signs

1.02 REFERENCES

- A. International Code Council (ICC):
 - 1. International Building Code (IBC) – 2015 Edition
 - 2. International Fire Code (ICF) – 2015 Edition
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 10 – Standards for Portable Fire Extinguishers
- C. Underwriters Laboratories, Inc. (UL)

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Product Data:
 - 1. Materials description dimensions of individual components; including ratings and classifications.
 - 2. Installation instructions for each product specified. Indicate installation procedures and accessories required for a complete installation.
- C. Warranty Information: Submit specified warranty.

1.04 QUALITY ASSURANCE

- A. Single-Source: Obtain extinguishers and components from one manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
- D. Regulatory Agency Requirements: Comply with IBC and local Building Code requirements if more than those specified.

1.05 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Manufacturer's Product Warranty: Submit a written warranty, for Owners acceptance, executed by the manufacturer agreeing to repair and replace faulty material or workmanship within the specified warranty period.
- C. Warranty Period:
 - 1. Six (6) year for fire extinguisher against material, finish and workmanship under conditions of normal use.
 - 2. Two (2) year for fire extinguisher sign against material, finish and workmanship under conditions of normal use.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. J.L. Industries, Inc.
 - 2. Larsen's Manufacturing Company.

2.02 FIRE EXTINGUISHER

- A. Multi-purpose dry chemical type.
 - a. Capacity 5 lbs..
 - b. Class: A, B, and C Fires
 - c. UL rating: 3A-40BC for each 3,000 square feet of floor area with a 75 foot maximum travel.
 - d. Construction: Heavy duty steel cylinder with metal valve and siphon tube, O-ring seal, replaceable valve stem seal, visual pressure gage, pull pin and upright squeeze grip.
 - e. Finish: Factory powder-coated; Red.
 - f. Locations: See Construction Drawings, Architectural Plans.

2.03 ACCESSORIES

- A. Mounting Bracket: Manufacture's standard steel bracket with strap designed to secure extinguisher to wall or structure to prevent accidental dislodgement, of sizes required for types and capacities of extinguishers indicated.
 - 1. Finish: Backed-enamel finish; Red.
 - 2. Strap and Clasp: Stainless steel.

3. Fastener(s): Stainless Steel.
- B. Fire Extinguisher Sign: Provide (1) flat, wall mounted fire extinguisher sign over each fire extinguisher location.
 1. Size: 18" tall x 4" wide.
 2. Color: Red and White
 3. Text: Sign to read: "FIRE EXTINGUISHER" in arrow pointing down.
 4. Attachment: Mechanically fastened to walls with stainless steel fasteners and double-sided mounting tape. (4) factory pre-drilled mounting holes and double-sided mounting tape.
 5. Material: .030 mil, high-impact plastic with images on panel that is protected by an over-laminate.
 6. Location: Mounted over each fire extinguisher. Mount bottom of sign 7'-0" above finish floor.
 7. Quantity:
Indian Hills: 1 Sign
Ponderosa: 1 Sign



PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine walls and partitions for suitable clearance, material and/or blocking where surface mounted extinguishers will be installed.
- B. Verify dimensions, tolerances and method of attachment with other work.
- C. Notify the contractor in writing of conditions detrimental to proper and timely completion of the installation.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's written instructions.
- B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
 1. Securely fasten mounting brackets to structure, square and plumb, to comply with manufacturer's instructions.
- C. A fire extinguisher shall be located as shown in Architectural Floor Plan or approved by Authority Having Jurisdiction.
- D. Identification: See Section 10400 – Identification Devices.

3.03 ADJUSTING, CLEANING AND PROTECTION

- A. Ensure that each extinguisher is fully charged, and that inspection of each extinguisher has been performed, as evidenced by the National Association of Fire Equipment Distributor certification tag, just prior to turnover.
- B. Clean extinguishers and mounting brackets of all construction dust, spray, tape, wrapping to prior to final turnover.
- C. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

SECTION 11000
GENERAL REQUIREMENTS FOR EQUIPMENT

PART 1 GENERAL

1.1 WORK INCLUDES

- A. Scope: This section specifies general requirements which are applicable to all mechanical equipment. Division 15 - Mechanical and Division 16 - Electrical (electrical equipment provided with mechanical equipment) also specify general requirements for mechanical equipment. The Contractor is responsible for ensuring that all mechanical equipment meets the requirements of those sections in addition to the specific requirements of the individual equipment specification section. In the event of a discrepancy between this section and the individual equipment specification, the requirements of the individual equipment specification take precedence.
- B. Equipment under this division includes providing and testing the equipment provided under Divisions 11, 12, 13, 14, and 15. The equipment provided under Divisions 11, 12, 13, 14, and 15 is subject to the general requirements of Division 11.
- C. Equipment Lists: Equipment lists presented in these Specifications are included for the convenience of the Contractor and may not represent a complete and precise listing of all equipment, devices, and material to be provided under this Contract. The Contractor agrees to rely upon his own material and equipment takeoff lists as necessary to meet the requirements of the Contract Documents.

1.2 QUALITY ASSURANCE

- A. Arrangement: The arrangement of equipment on the Drawings is based upon information available to the Owner at the time of design and is not intended to show exact dimensions peculiar to a specific manufacturer. The Drawings are, in part, diagrammatic, and some features of the illustrated equipment installation may require revision to meet actual equipment installation requirements. Structural supports, foundations, connected piping and valves, electrical and instrument equipment connections shown may have to be altered to accommodate the equipment provided. No additional payment will be made for such revisions and alterations. Substantiating calculations and drawings shall be submitted prior to beginning the work.
- B. References: This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
AFBMA Std 9-78	Load Ratings and Fatigue Life for Ball Bearings
AFBMA Std 11-78	Load Ratings and Fatigue Life for Roller Bearings
ANSI B1.1-82	Unified Inch Screw Threads
ANSI B1.20.1-83	Pipe Threads, General Purpose (Inch)
ANSI B16.1-75	Cast Iron Pipe Flanges and Flanged Fittings, Class 125
ANSI B18.2.1-81	Square and Hex Bolts and Screws, Including Askew Head Bolts, Hex Cap Screws and Lag Screws
ANSI B18.2.2-72	Square and Hex Nuts
NFPA 70-1987	National Electrical Code (NEC)
UBC-1985	Uniform Building Code
UMC-1985	Uniform Mechanical Code

All applicable State and local codes.

- C. Unit Responsibility: Equipment systems made up of two or more components shall be provided as a unit by the responsible manufacturer. Unless otherwise specified, the Contractor shall obtain each system from the supplier of the driven equipment, which supplier shall provide all components of the system to enhance compatibility, ease of construction, and efficient maintenance. Contractor is responsible to the Owner for testing and guarantee of all systems.
- D. Identification of Listed Products:
 - 1. Electrical equipment and materials shall be listed for the purpose for which they are to serve, by an independent testing laboratory, Underwriters Laboratories (UL).
 - 2. When a product is not available with a testing laboratory listing for the purpose for which it is to serve, the product may be required by the inspection authority to undergo a special inspection at the manufacturer's place of assembly or onsite. All costs and expenses incurred for such inspections, certifications, and modifications shall be included in the original contract price.
- E. Factory Tests: Where specified in the individual product specification section, factory tests shall be performed at the place of fabrication and performed upon completion of manufacture or assembly. Factory tests shall be included in the original contract price.

1.3 FIELD TESTING

- A. Equipment testing and plant startup are requisite to satisfactory completion of the Contract and, therefore, shall be completed within the Contract time. Except where otherwise provided, all work specified in this section shall be performed at no additional cost to the Owner.

- B. Where specified in the individual product specification section, the Contractor shall provide the services of an experienced and authorized representative of the manufacturer or supplier who shall visit the site of the work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the Contractor shall arrange to have the equipment supplier's representative re-visit the job site as often as necessary until any and all trouble is corrected, and the equipment installation and operation are satisfactory to the Engineer.
- C. The Contractor shall require that each equipment supplier's representative furnish to the Engineer a written report addressed to the Owner certifying that the equipment has been properly installed and lubricated, is in accurate alignment, is free from any undue stress imposed by connecting piping or anchor bolts, and has been operated satisfactorily under full-load conditions.
- D. The Contractor shall be responsible for scheduling all operations testing. The Contractor is advised that the Engineer and the Owner's operating personnel will witness operations testing and that the equipment supplier's representative shall be required to instruct the Owner's operating personnel in correct operation and maintenance procedures. Such instruction shall be scheduled at a time arranged with the Owner at least two (2) weeks in advance, and shall be provided while the respective representative's equipment is fully operational. On-site instruction shall be given by qualified persons who have been made familiar in advance with the equipment and systems in the plant. The Contractor shall have previously furnished the Operation and Maintenance manuals required under Section 01730.
- E. The Contractor shall provide all personnel, chemicals, electricity, fuel, oil, grease, and all other necessary equipment, facilities and services required for conducting the tests.
- F. See also Section 01600.

1.4 SUBMITTALS

- A. Submittals shall be made as specified for each equipment item or group of related equipment items. Submittals shall be in accordance with Section 01300 and shall identify the equipment by the number listed in the specification section, manufacturer, and type designation.

1.5 PROTECTION DURING SHIPMENT

- A. Shipping: Equipment shall be shipped in sealed, weathertight, enclosed conveyances and protected against damaging stresses during transport. Bearing housings shall be wrapped or otherwise sealed to prevent contamination by grit and dirt; and ventilation and other types of openings shall be taped closed. Any damage incurred during shipping shall be corrected to conform to the requirements of the Contract before the assembly is incorporated into the work. The Contractor shall bear the costs arising out of dismantling, inspection, repair, and reassembly.

- B. Factory Applied Coatings: Each item of equipment shall be shipped to the site of the work with either the manufacturer's shop-applied prime coating or shop-applied finish coating. Manufacturer's shop-applied prime coating shall be compatible with the field-applied finish coating. The prime coating shall be applied over clean dry surfaces in accordance with the paint manufacturer's recommendations. The prime coating will serve as a base for field-applied finish coats. All factory finishes shall be approved by the Engineer. Non-approved finishes shall be painted as specified in Section 09900.

PART 2 PRODUCTS

2.1 FLANGES AND PIPE THREADS

- A. Flanges on equipment and appurtenances provided under this section shall conform in dimensions and drilling to ANSI B16.1, Class 125. Pipe threads shall conform in dimension and limits of size to ANSI B1.1, coarse thread series, Class 2 fit. Threaded flanges shall have a standard taper pipe thread conforming to ANSI B1.20.1. Unless otherwise specified, flanges shall be flat faced. Flange assembly bolts shall be heavy pattern, hexagonal head, carbon steel machine bolts with heavy pattern, hot pressed, hexagonal nuts conforming to ANSI B18.2.1 and B18.2.2. Threads shall be Unified Screw Threads, Standard Coarse Thread Series, Class 2A and 2B, ANSI B1.1.

2.2 BEARINGS

- A. Unless otherwise specified, equipment bearings shall be oil or grease lubricated, ball- or roller-type, designed to withstand the stresses of the service specified. Each bearing shall be rated in accordance with the latest revisions of AFBMA Methods of Evaluating Load Ratings of Ball and Roller Bearings. Unless otherwise specified, equipment bearings shall have a minimum L-10 rating life of 50,000 hours. The rating life shall be determined using the maximum equipment operating speed.
- B. Grease lubricated bearings, except those specified to be factory sealed and lubricated, shall be fitted with easily accessible grease supply, flush, drain and relief fittings. Extension tubes shall be used when necessary. Grease supply fittings shall be standard hydraulic alemite-type.
- C. Oil lubricated bearings shall be equipped with either a pressure lubricating system or a separate oil reservoir-type system. Each oil lubrication system shall be of sufficient size to safely absorb the heat energy normally generated in the bearing under a maximum ambient temperature of 60 degree C and shall be equipped with a filler pipe and an external level indicator gauge.

2.3 V-BELT ASSEMBLIES

- A. V-belt assemblies shall be Dodge Dyna-V belts with matching Dyna-V sheaves and Dodge Taper-lock bushings, Wood's Ultra V-belts with matching Ultra-V sheaves and Wood's Sure-Grip bushings, or equal. Where stationary control variable pitch sheaves are specified, they shall be dry lubricated, and shall have locking collars to clamp all movable parts securely in place to eliminate relative motion between sheave parts. The sheaves shall be adjustable only when the unit is stopped and the sheaves are unloaded.

Sheaves and bushings shall be statically balanced. Additionally, sheaves and bushings which operate at a peripheral speed of more than 5500 feet per minute shall be dynamically balanced. Sheaves shall be separately mounted on their bushings by means of three pull-up grab or cap tightening screws. Bushings shall be key seated to the drive shaft.

Belts shall be selected for not less than 150 percent of rated driver horsepower and, where two sheaves sized are specified, shall be capable of operating with either set of sheaves. Belts shall be of the antistatic-type where explosion-proof equipment is specified.

2.4 SEALS

- A. Mechanical: Unless otherwise specified, rotating shafts shall be provided with mechanical seals and stuffing boxes tapped for flushing seal faces. Seals shall be factory installed. Seals shall be internal, single or double as specified, and unbalanced, except balanced seals shall be provided when shaft speed is greater than 3600 rpm for variable speed pumps, or when pressures are greater than shown in the following. Mechanical seals for variable speed pump applications shall be specifically designed to accommodate shaft deflection incurred under specified operating conditions.

Limits for Unbalanced Seals

Seal Inside Diameter, inches	Shaft Speed, rpm	Sealing Pressure, psig
<2 to 2	Up to 1800	100
	1801 to 3600	50
Over 2 to 4	Up to 1800	50
	1801 to 3600	25

Single unbalanced seals shall be Crane 8-1, Durametallic RO, or equal. Single balanced seals shall be Chesterton 880, Crane 8B-1, or equal. Double seals shall be Chesterton 241, Durametallic RO/RD, or equal.

To maintain the necessary minimum or maximum pressure across the seal faces, spring pressure shall be uniformly distributed to the sealing faces by a coil spring or multiple springs. The rotating seal element shall be clamped to the shaft and provided with an O-ring seal. The stationary seal element shall be sealed with O-ring or gasket material.

Seal faces shall be either tungsten carbide, or silicon carbide. Elastomeric materials shall be Viton. Metal parts shall be Type 316 stainless steel.

- B. Shaft Packing: Where shaft packing is specified, stuffing boxes shall be tapped to permit introduction of seal liquid and shall hold a minimum of five rows of packing. Unless otherwise specified, lantern rings shall be bronze, packing shall be die-molded packing rings of non-asbestos material suitable for the intended service and as recommended by the manufacturer, and glands shall be bronze, two-piece split construction. Lantern rings shall be of two-piece construction and shall be provided with tapped holes to facilitate removal. Lantern rings shall be drilled and tapped 3 NC-20. Threaded lantern ring removal tools shall be provided with spare parts for each pump.

2.5 COUPLINGS

- A. Unless otherwise specified in the particular equipment sections, equipment with a driver greater than two HP, and where the input shaft of a driven unit is directly connected to the output shaft of the driver, shall have its two shafts connected by a flexible coupling which can accommodate angular misalignment, parallel misalignment and end float, and which cushions shock loads and dampens torsional vibrations. The flexible member shall consist of a tire with synthetic tension members bonded together in rubber. The flexible member shall be attached to flanges by means of clamping rings and cap screws, and the flanges shall be attached to the stub shaft by means of taperlock bushings which shall give the equivalent of a shrunk-on fit. There shall be no metal-to-metal contact between the driver and the driven unit. Each coupling shall be sized and provided as recommended by the coupling manufacturer for the specific application, considering horsepower, speed of rotation and type of service.
- B. Where torque or horsepower capacities of couplings of the foregoing type is exceeded, Thomas-Rex, Falk Steel Flex, or equal, couplings will be acceptable, provided they are sized in accordance with the equipment manufacturer's recommendations and sizing data are submitted. They shall be installed in conformance to the coupling manufacturer's instructions.

2.6 GUARDS

- A. Exposed moving parts shall be provided with guards which meet the requirements of Occupational Safety and Health Administration (OSHA). Guards shall be fabricated of 14-gauge steel, 1/2-13-15 expanded metal screen to provide visual inspection of moving parts without removal of the guard. Guards shall be galvanized after fabrication and shall be designed to be readily removable to facilitate maintenance of moving parts. Reinforced holes shall be provided. Provisions shall be made to extend lube fittings through guards.

2.7 CAUTION SIGNS

- A. Equipment with guarded moving parts which operates automatically or by remote control shall be identified by signs reading "CAUTION - AUTOMATIC EQUIPMENT MAY START AT ANY TIME." Signs shall be constructed of corrosion-proof material. The sign size, material and pattern location shall be as specified in Section 10400.

2.8 PRESSURE TAPS, TEST PLUGS AND GAUGES

- A. Pressure taps shall be provided on the suction and discharge sides of pumps, blowers and compressors. Pressure and vacuum test plugs and gauges shall be provided where specified. Test plugs and gauges shall be as specified in Division 15.

2.9 NAMEPLATES

- A. Nameplates shall be provided on each item of equipment and shall contain the specified equipment name or abbreviation and equipment number. Equipment nameplates shall be engraved or stamped on stainless steel or non-ferrous material and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel or non-ferrous screws or drive pins.

2.10 LUBRICANTS

- A. The Contractor shall provide for each item of mechanical equipment a supply of the lubricant required for the commissioning period. Lubricants shall be of the type recommended by the equipment manufacturer and shall be products of the Owner's current lubricant supplier. The Contractor shall limit the various types of lubricants by consolidating them, with the equipment manufacturer's approval, into the least number of different types. Not less than ninety (90) days before the date shown in his construction schedule for starting, testing and adjusting equipment, the Contractor shall provide the Owner with three (3) copies of a list showing the required lubricants, after consolidation, for each item of mechanical equipment. The list shall show estimated quantity of lubricant needed for a full year's operation, assuming the equipment will be operating continuously.

2.11 PRODUCT DATA

- A. Information shall be provided for each item of equipment as specified under individual specification sections. This information shall be identified by the equipment number listed in the Specifications and Drawings.

2.12 SPARE PARTS

- A. Spare parts, wherever required by detailed specification sections, shall be stored in accordance with the provisions of this paragraph. Spare parts shall be tagged by project equipment number and identified as to part number, equipment manufacturer and subassembly component (if appropriate). Spare parts subject to deterioration, such as

ferrous metal items and electrical components, shall be properly protected by lubricants or desiccants and encapsulated in hermetically sealed plastic wrapping. The quality of protection shall be equal to that required for shipment overseas and storage in humid, tropical climates. Spare parts with individual weights less than 50 pounds and dimensions less than 2 feet wide, 18 inches high, and 3 feet in length shall be stored in a heavy wooden box with a hinged wooden cover. Hinges shall be heavy-duty strap type. The box shall be painted and identified with stenciled lettering stating the name of the equipment, equipment numbers, and the words "spare parts." A neatly typed inventory of spare parts shall be taped to the underside of the cover.

2.13 ANCHOR BOLTS

- A. Anchor bolts shall be designed for lateral forces for both pullout and shear.

PART 3 EXECUTION

3.1 GENERAL

- A. Equipment shall be provided and tested within the tolerances recommended by the equipment manufacturer where indicated in the individual mechanical specification sections. Certain sections may also require that equipment additionally be installed and tested under the direction of installers who have been factory-trained by the equipment manufacturer. This requirement, however, shall not be construed as relieving the Contractor of his overall responsibility for this portion of the work.

END OF SECTION

**SECTION 11103
VERTICAL MULTISTAGE PUMP**

PART 1 GENERAL

1.1 GENERAL

- A. Work described in this section includes providing all labor, equipment, materials, tools and incidentals required for a complete and operable installation of the Vertical Multistage Pump system as shown on the Drawings and specified herein.

1.2 RELATED SECTIONS

- A. Section 01025 - Measurement and Payment
- B. Section 01300 - Submittals
- C. Section 01400 - Quality Control
- D. Section 01650 – Starting of Systems
- E. Section 15060 - Pipe and Pipe Fittings
- F. Division 16 - Electrical

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM) Publications
- B. American Institute of Steel Construction (AISC) Publications
- C. American Welding Society (AWS) Publications
- D. American Structures Painting Council (ASPC) Publications

1.4 SUBMITTALS

- A. Submit in accordance with Section 01300 and Section 11000.
- B. Submit a copy of this specification section, with addendum updates included, with each paragraph clearly marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. If deviations from the specifications are indicated and therefore requested by the Contractor, the submittal shall be accompanied by a detailed, written justification for each deviation. Failure to include a copy of the marked-up specification sections, along with justification for any requested deviations to the specification requirements, with the submittal shall be cause for rejection of the entire submittal with no further consideration. The Owner

retains the right to reject any proposed deviations in favor of this specification, as written. Standard submittal data for approval must consist of:

1. Manufacturer's Certificate: Certify that products meet or exceed specified requirements and are suitable for the use intended. Pumps and motors specified for variable speed operation through a variable frequency controller shall be capable of operating at low reduced speed for extended periods of time without overheating and to operate without excessive vibrations or harmonics at any speed.
 2. Pump and Motor Performance data.
 3. Pump Curves showing operation points.
 4. NPSHR Curve.
 5. Submergence requirements.
 6. BHP and Efficiencies.
 7. VFD Analysis: The variable frequency drive (VFD) analysis included with the submittal shall be from full speed (60 hz) to at least 30 hz in 5 hz increments or to the manufacturer's recommended minimum speed, whichever is less. The data shall be in tabular and graphical form and be plotted with the listed system curve information. (May be submitted following startup and testing procedures.) The minimum possible speed shall also be plotted on the pump VFD analysis plot.
 8. Shop drawings showing pump dimensions, weights, materials of construction, and assembly.
 9. Electrical Motor Data
 10. Control Drawing and Data
 11. Typical Installation Guides
 12. Technical Manuals
 13. Parts List
 14. Provide written copies of manufacturer's warranties on products described in this specification section.
 15. Manufacturer's Equipment Storage Recommendations.
 16. Manufacturer's Standard Recommended Start-Up Report Form.
 17. Submit pump and motor testing reports per this section. Submit proposed pump and motor testing procedures and protocol.
- C. Provide Equipment Operation and Maintenance Manuals to the Owner per Section 01730.
- D. Submit proposed test procedures (including instrument specifications) for conducting certified pump tests in accordance with Hydraulic Institute Standards.

1.5 QUALITY ASSURANCE

- A. Manufacturer shall have a minimum of five (5) years of experience producing equipment substantially similar to that required and shall be able to submit documentation of at least fifteen (15) independent installations using the same size or larger equipment as detailed below. Each installation must have been in satisfactory operation for at least five (5) years.
- B. The contract documents represent the minimum acceptable standards for the equipment. All equipment shall conform fully in every respect to the requirements of the respective parts and sections of the drawings and specifications. The entire unit shall be Manufacturer's standard product, but shall be modified, redesigned, furnished with special features or accessories, made of materials or provided with finishes as may be necessary to conform to the quality mandated by the technical and performance requirements of the specification.
- C. Fabrication shall be done in compliance with all applicable ASTM standards or equivalent international standards.
- D. The pump shall be heavy duty, vertical multistage pump type units designed for handling potable water and shall be NSF 61 Certified and full guaranteed for this use.
- E. The pump, mechanical seals, and motor units provided under this specification shall be from the same manufacturer in order to achieve standardization of operation, maintenance, spare parts, manufacturer's service and warranty.

1.6 WARRANTY

- A. Equipment supplied under this section shall be warranted to be free from defects in workmanship, design, and materials for a period of one (1) year from the date of Substantial Completion. If any part of the equipment should prove to be defective during the warranty period, the Manufacturer shall replace the part at no expense to the Owner. Additionally, the pump manufacturer warranty shall be for a period of five (5) years from the date of installation or start-up, or for five (5) years after the date of shipment, whichever comes first.

1.7 DESIGN REQUIREMENTS

A. Ponderosa Booster Pump Station – Duty Pumps

	Pumps
Number of Pumping Units	2
Primary Operating Point (gpm/ft TDH)	200 gpm / 90 ft,
Secondary Operating Point (gpm/ft TDH)	150 / 102 ft
Minimum Efficiency at Primary Operating Point (%)	76.15%
Shut-off Head (ft)	0 gpm / 120 ft
Maximum Motor Horsepower (HP)	10
Maximum Motor Speed (rpm)	3500
Drive Type	Variable frequency drive

B. Ponderosa Booster Pump Station – Jockey Pump

	Pumps
Number of Pumping Units	1
Primary Operating Point (gpm/ft TDH)	24 gpm / 83 ft,
Secondary Operating Point (gpm/ft TDH)	10 gpm / 94 ft
Minimum Efficiency at Primary Operating Point (%)	63.03%
Shut-off Head (ft)	0 gpm / 99 ft
Maximum Motor Horsepower (HP)	1
Maximum Motor Speed (rpm)	3500
Drive Type	Variable frequency drive

C. Indian Hills Booster Pump Station – Duty Pumps

	Pumps
Number of Pumping Units	2
Primary Operating Point (gpm/ft TDH)	150 gpm / 74 ft,
Secondary Operating Point (gpm/ft TDH)	80 gpm / 90 ft
Minimum Efficiency at Primary Operating Point (%)	79.9%
Shut-off Head (ft)	0 gpm / 99 ft
Maximum Motor Horsepower (HP)	5
Maximum Motor Speed (rpm)	3500
Drive Type	Variable frequency drive

D. Indian Hills Booster Pump Station- Jockey Pump

	Pumps
Number of Pumping Units	1
Primary Operating Point (gpm/ft TDH)	22 gpm / 56.6 ft
Secondary Operating Point (gpm/ft TDH)	10 gpm / 63 ft
Minimum Efficiency at Primary Operating Point (%)	61.66 %
Shut-off Head (ft)	0 gpm / 66 ft
Maximum Motor Horsepower (HP)	0.75
Maximum Motor Speed (rpm)	3500
Drive Type	Variable frequency drive

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer used as the basis of design:

1. Pump Type

a. Indian Hills Station

- i. Duty Pumps– Pentair PVM(X)33-1 was used as the basis of design.
- ii. Jockey Pump - Pentair PVM(X)5-2 was used as the basis of design.

b. Ponderosa Station

- i. Duty Pumps – Pentair PVM(X)45-1 was used as the basis of design.
- ii. Jockey Pump - Pentair PVM(X)5-3 was used as the basis of design.

2. The manufacturer's representative is:

Scott Jessick
RC WORST & COMPANY, INC.
625 Best Avenue, Coeur D'Alene, ID 83814
(208) 664-2133
Scott.jessick@rcworst.com

B. Approved Manufacturers:

1. Pentair
2. "Or-equals" will be reviewed accordance with the Instructions to Bidders, Article 11 and as listed below:
 - a. N/A

2.2 MATERIALS

A. Pump Materials:

1. Pump Material: Stainless Steel
2. Elastomer: EPDM

2.3 FABRICATION

A. GENERAL

1. Provide a NSF 61 certified pump capable of handling potable water. The pump and motors shall be fitted with ductile iron lifting bales. Final connection shall insure zero leakage between pump and discharge connection flange.

B. MAJOR COMPONENTS

1. Provide components, as specified, with smooth surfaces devoid of blow holes and other irregularities.
2. The pump shall be a vertical in-line multistage pump, suitable for operation with a VFD.
3. The pumps impeller, diffuser, shaft, pump base and outer sleeve shall be constructed of 316 stainless steel.
4. The pumps shall include silicon carbide seals with EPDM elastomers. Seals shall be easily replaced without dismantling the pump.
5. The pump shall have ANSI Class 250 flanged connections.
6. The pump and motor shall mount on a concrete foundation base, as indicated on the plans, using bolt or lag screws into threaded inserts to allow removal of the drive motor without disturbing the pump liquid end or the piping.
7. Pump shall be coated with high quality factory approved paint and name-plated before shipment from the factory. Coating shall comply with Section 09900.
8. The pump shall be NSF-61 certified.
9. Pumps shall be manufactured and assembled in an ISO-9001 certified facility.

C. MOTOR

1. Motor(s) shall be a NEMA configuration in accordance with the latest NEMA Standards and shall have a sufficient horsepower rating to operate the pump at any point within the manufacturer's recommended operating range on the pump's head-capacity curve without overloading the nameplate horsepower rating of the motor, regardless of service factor.
2. Motor shall comply with Specification 16155.

PART 3 EXECUTION

3.1. EXAMINATION

- A. Verify all equipment and materials are present and meet the requirements of these Specifications.

3.2. INSTALLATION PERSONNEL

- A. The Contractor shall employ qualified, competent personnel for the installation, testing, and start-up of all equipment.

3.3. LUBRICANTS

- A. The Contractor shall furnish all necessary oils, lubricants, grease guns, or other necessary applicators and shall lubricate the mechanical equipment prior to initial operation. The grade of oil and grease furnished by the Contractor shall be in accordance with the recommendation of the equipment manufacturer. The Contractor shall supply a 12-month supply of each lubricant.

3.4. COORDINATION OF RELATED EQUIPMENT

- A. Contractor shall carefully coordinate equipment, motors, drives, and controllers so that the completed system operates satisfactorily under all operating conditions.

3.5. INSTALLATION

- A. Contractor shall verify all dimensions in the field to ensure compliance of equipment dimensions with the drawings. Contractor shall notify Engineer of significant deviations.
- B. Installation of the equipment shall be in strict accordance with the contract documents and the manufacturer's instructions and shop drawings. Manufacturer shall supply anchor bolts for the equipment. Contractor shall install the anchor bolts in accordance with the manufacturer's recommendations.
- C. Install electrical and control components in accordance with the manufacturer's recommendations and the electrical division of these Technical Specifications.

3.6. STARTUP SERVICES

- A. Perform Starting of Systems and field testing in accordance with Division 16 and 11000.

3.7. HYDRAULIC TESTING

A. CERTIFIED PUMP TESTS (PRIOR TO SHIPMENT)

- 1. Each centrifugal pump furnished under these specifications shall be tested at the factory to Verify Individual Performance (VIP). Certified copies of all test reports shall be submitted to the Engineer for approval prior to shipment. Each unit shall be hydrostatically tested in accordance with the Hydraulic Institute Standards.
- 2. Submit certified pump tests for review and approval. Equipment shall not be shipped without approved test reports.

B. FIELD TESTING (FOLLOWING INSALLATION)

- 1. Per Section 11000

END OF SECTION

SECTION 11111
HORIZONTAL CLOSE COUPLED END SUCTION CENTRIFUGAL PUMP

PART 1 GENERAL

1.1 GENERAL

- A. Work described in this section includes providing all labor, equipment, materials, tools and incidentals required for a complete and operable installation of the Horizontal Close Coupled End Suction Centrifugal Pump system as shown on the Drawings and specified herein.

1.2 RELATED SECTIONS

- A. Section 01025 - Measurement and Payment
- B. Section 01300 - Submittals
- C. Section 01400 - Quality Control
- D. Section 01650 – Starting of Systems
- E. Section 15060 - Pipe and Pipe Fittings
- F. Division 16 - Electrical

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM) Publications
- B. American Institute of Steel Construction (AISC) Publications
- C. American Welding Society (AWS) Publications
- D. American Structures Painting Council (ASPC) Publications

1.4 SUBMITTALS

- A. Submit in accordance with Section 01300 and Section 11000.
- B. Submit a copy of this specification section, with addendum updates included, with each paragraph clearly marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. If deviations from the specifications are indicated and therefore requested by the Contractor, the submittal shall be accompanied by a detailed, written justification for each deviation. Failure to include a copy of the marked-up specification sections, along with justification for any requested deviations to the specification requirements, with the submittal shall be

SECTION 11111 – 1 HORIZONTAL END SUCTION PUMP

cause for rejection of the entire submittal with no further consideration. The Owner retains the right to reject any proposed deviations in favor of this specification, as written. Standard submittal data for approval must consist of:

1. Manufacturer's Certificate: Certify that products meet or exceed specified requirements and are suitable for the use intended. Pumps and motors specified for variable speed operation through a variable frequency controller shall be capable of operating at low reduced speed for extended periods of time without overheating and to operate without excessive vibrations or harmonics at any speed.
2. Pump and Motor Performance data.
3. Pump Curves showing operation points.
4. NPSHR Curve.
5. Submergence requirements.
6. BHP and Efficiencies.
7. VFD Analysis: The variable frequency drive (VFD) analysis included with the submittal shall be from full speed (60 hz) to at least 30 hz in 5 hz increments or to the manufacturer's recommended minimum speed, whichever is less. The data shall be in tabular and graphical form and be plotted with the listed system curve information. (May be submitted following startup and testing procedures.) The minimum possible speed shall also be plotted on the pump VFD analysis plot.
8. Shop drawings showing pump dimensions, weights, materials of construction, and assembly.
9. Electrical Motor Data
10. Control Drawing and Data
11. Typical Installation Guides
12. Technical Manuals
13. Parts List
14. Provide written copies of manufacturer's warranties on products described in this specification section.
15. Manufacturer's Equipment Storage Recommendations.
16. Manufacturer's Standard Recommended Start-Up Report Form.

SECTION 11111 – 2 HORIZONTAL END SUCTION PUMP

- 17. Submit pump and motor testing reports per this section. Submit proposed pump and motor testing procedures and protocol.
- C. Provide Equipment Operation and Maintenance Manuals to the Owner per Section 01730.
- D. Submit proposed test procedures (including instrument specifications) for conducting certified pump tests in accordance with Hydraulic Institute Standards.

1.5 QUALITY ASSURANCE

- A. Manufacturer shall have a minimum of five (5) years of experience producing equipment substantially similar to that required and shall be able to submit documentation of at least fifteen (15) independent installations using the same size or larger equipment as detailed below. Each installation must have been in satisfactory operation for at least five (5) years.
- B. The contract documents represent the minimum acceptable standards for the equipment. All equipment shall conform fully in every respect to the requirements of the respective parts and sections of the drawings and specifications. The entire unit shall be Manufacturer's standard product, but shall be modified, redesigned, furnished with special features or accessories, made of materials or provided with finishes as may be necessary to conform to the quality mandated by the technical and performance requirements of the specification.
- C. Fabrication shall be done in compliance with all applicable ASTM standards or equivalent international standards.
- D. The pump shall be heavy duty, centrifugal horizontal close-coupled end suction pump type units designed for handling potable water and shall be NSF 61 Certified and full guaranteed for this use.
- E. The pump, mechanical seals, and motor units provided under this specification shall be from the same manufacturer in order to achieve standardization of operation, maintenance, spare parts, manufacturer's service and warranty.

1.6 WARRANTY

- A. Equipment supplied under this section shall be warranted to be free from defects in workmanship, design, and materials for a period of one (1) year from the date of Substantial Completion. If any part of the equipment should prove to be defective during the warranty period, the Manufacturer shall replace the part at no expense to the Owner. Additionally, the pump manufacturer warranty shall be for a period of five (5) years from the date of installation or start-up, or for five (5) years after the date of shipment, whichever comes first.

SECTION 11111 – 3 HORIZONTAL END SUCTION PUMP

1.7 DESIGN REQUIREMENTS

A. Ponderosa Booster Pump Station

Pumps	
Number of Pumping Units	2
Primary Operating Point (gpm/ft TDH)	1,500 gpm / 81 ft,
Secondary Operating Point (gpm/ft TDH)	800 gpm / 88 ft
Minimum Efficiency at Primary Operating Point (%)	84.2%
Shut-off Head (ft)	0 gpm / 86 ft
Maximum Motor Horsepower (HP)	50
Maximum Motor Speed (rpm)	1200
Impeller Diameter	13.44 inch
Drive Type	Variable frequency drive

B. Indian Hills Booster Pump Station

Pumps	
Number of Pumping Units	2
Primary Operating Point (gpm/ft TDH)	1,500 gpm / 78 ft
Secondary Operating Point (gpm/ft TDH)	800 gpm / 87 ft
Minimum Efficiency at Primary Operating Point (%)	84.09%
Shut-off Head (ft)	0 gpm / 85 ft
Maximum Motor Horsepower (HP)	50
Maximum Motor Speed (rpm)	1200
Impeller Diameter	13.31 inch
Drive Type	Variable frequency drive

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer used as the basis of design:

1. Pentair Aurora Model 3801-6X8X13.5 was used as the basis of design.
2. The manufacturer's representative is:
Scott Jessick
RC WORST & COMPANY, INC.
625 Best Avenue, Coeur D'Alene, ID 83814
(208) 664-2133
Scott.jessick@rcworst.com

B. Approved Manufacturers:

1. Pentair Aurora

SECTION 11111 – 4 HORIZONTAL END SUCTION PUMP

2. "Or-equals" will be reviewed accordance with the Instructions to Bidders, Article 11 and as listed below:
 - a. N/A

2.2 MATERIALS

A. Pump Materials:

1. Pump Material: Stainless Steel
2. Casing: Cast Iron, ASTM A48
3. Impeller: 316 Stainless Steel
4. Shaft: Steel AISI C1045
5. Shaft Sleeve: Stainless Steel, AISI 316
6. Motor Bracket: Cast Iron, ASTM A48
7. Seal Plate: Cast Iron, ASTM A48
8. Power Frame Body: Cast Iron, ASTM A48
9. Sealing: Type 21
10. Seal Material: Carbon-ceramic

2.3 FABRICATION

A. GENERAL

1. Provide a NSF 61 certified pump capable of handling potable water. The pump and drive shall be fitted with ductile iron lifting bales. Final connection shall insure zero leakage between pump and discharge connection flange.

B. MAJOR COMPONENTS

1. Provide components of cast material, as specified, with smooth surfaces devoid of blow holes and other irregularities.
2. The pump shall be a centrifugal horizontal close-coupled end suction pump, suitable for operation with a VFD.
3. The pump volute shall be Ductile Iron (ASTM A536) with an integrated foot to support the volute and allow back pullout feature. The pump shall include gauge tappings at the suction and discharge flanges and vent and drain tappings at top, bottom and side of the volute. The pump shall be a simple design with no center drop out spacer coupling needed to disassemble the rotating elements

SECTION 11111 – 5 HORIZONTAL END SUCTION PUMP

without disturbing the casing or suction, the discharge pipping, and the electrical motor connections.

4. The impeller shall be of enclosed type Stainless Steel (ASTM A743 Type 316), finished all over, the exterior being turned and the interior being finished smooth and cleaned of all burrs, trimmings, and irregularities. The impeller shall be dynamically balanced to ANSI/HI 9.6.4 balance grade G6.#, keyed to the shaft, and fastened with a washer, gasket and cap screw.
5. The pumps internal design shall include a self-flushing Mechanical seal with Stainless Steel (ASTM 303) metal parts, Buna-N elastomers parts, Ceramic seat and Carbon washer suitable for continuous operation at 225°F (107°C). The pump shall be equipped with a Steel (AISI C1045) shaft and fitted with a replaceable Stainless Steel 316 ASTM shaft sleeve to minimize shaft wear. The sleeve shall be sealed to the impeller hub by an O-ring, and shall be positively driven by a pin to the keyway. The use of adhesive compounds to fasten the sleeve to the shaft shall not be accepted.
6. The pump seal plate and motor bracket shall be a two piece design, and shall provide an adequate area for internal recirculation of the pumped fluid around the sealing medium.
7. The pump shall be able to handle 175 PSI working pressure.
8. The pump and motor shall mount on a concrete foundation base, as indicated on the plans, using bolt or lag screws into threaded inserts to allow removal of the drive motor without disturbing the pump liquid end or the piping.
9. Pump shall be coated with high quality factory approved paint and name-plated before shipment from the factory. Coating shall comply with Section 09900.
10. The pump shall be NSF-61 certified.
11. Pumps shall be manufactured and assembled in an ISO-9001 certified facility.

C. MOTOR

1. Motor(s) shall be a NEMA configuration in accordance with the latest NEMA Standards and shall have a sufficient horsepower rating to operate the pump at any point within the manufacturer's recommended operating range on the pump's head-capacity curve without overloading the nameplate horsepower rating of the motor, regardless of service factor.
2. Motors shall comply with Specification 16155.

SECTION 11111 – 6 HORIZONTAL END SUCTION PUMP

PART 3 EXECUTION

3.1. EXAMINATION

- A. Verify all equipment and materials are present and meet the requirements of these Specifications.

3.2. INSTALLATION PERSONNEL

- A. The Contractor shall employ qualified, competent personnel for the installation, testing, and start-up of all equipment.

3.3. LUBRICANTS

- A. The Contractor shall furnish all necessary oils, lubricants, grease guns, or other necessary applicators and shall lubricate the mechanical equipment prior to initial operation. The grade of oil and grease furnished by the Contractor shall be in accordance with the recommendation of the equipment manufacturer. The Contractor shall supply a 12-month supply of each lubricant.

3.4. COORDINATION OF RELATED EQUIPMENT

- A. Contractor shall carefully coordinate equipment, motors, drives, and controllers so that the completed system operates satisfactorily under all operating conditions.

3.5. INSTALLATION

- A. Contractor shall verify all dimensions in the field to ensure compliance of equipment dimensions with the drawings. Contractor shall notify Engineer of significant deviations.
- B. Installation of the equipment shall be in strict accordance with the contract documents and the manufacturer's instructions and shop drawings. Manufacturer shall supply anchor bolts for the equipment. Contractor shall install the anchor bolts in accordance with the manufacturer's recommendations.
- C. Install electrical and control components in accordance with the manufacturer's recommendations and the electrical division of these Technical Specifications.

3.6. STARTUP SERVICES

- A. Perform Starting of Systems and field testing in accordance with Division 16 and 11000.

3.7. HYDRAULIC TESTING

- A. CERTIFIED PUMP TESTS (PRIOR TO SHIPMENT)
 - 1. Each centrifugal pump furnished under these specifications shall be tested at the factory to Verify Individual Performance (VIP). Certified copies of all test

SECTION 11111 – 7 HORIZONTAL END SUCTION PUMP

reports shall be submitted to the Engineer for approval prior to shipment. Each unit shall be hydrostatically tested in accordance with the Hydraulic Institute Standards.

2. Submit certified pump tests for review and approval. Equipment shall not be shipped without approved test reports.

B. FIELD TESTING (FOLLOWING INSALLATION)

1. Per Section 11000

END OF SECTION

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**SECTION 15060
PIPE AND PIPE FITTINGS**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. PVC Pipe and Fittings
- B. High Density Polyethylene Pipe and Fittings
- C. Ductile Iron Pipe and Fittings
- D. Steel Pipe and Fittings
- E. Galvanized Iron Pipe and Fittings
- F. Stainless Steel Pipe and Fittings
- G. Pipe Penetration Seals
- H. Couplings
- I. Cam-Lock Couplings
- J. Mechanical Joint Restraints
- K. Thrust Blocks
- L. Hardware
- M. Tests
- N. Valve Boxes
- O. Pipe Saddles
- P. Locating Wire and Marking Tape

1.2 REFERENCES

- A. ANSI/AWWA C104/A21.4: Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water
- B. ANSI/AWWA C110/A21.10: Ductile Iron and Gray-Iron Fittings for Water and Other Liquids
- C. ANSI/AWWA C111/A21.11: Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings

- D. ANSI/AWWA C115/A21.15: Flanged Ductile Iron Pipe with Threaded Flanges
- E. ANSI/AWWA C150/A21.50: Thickness Design of Ductile Iron Pipe
- F. ANSI/AWWA C151/A21.51: Ductile Iron Pipe
- G. ANSI/AWWA C153/A21.53: Ductile Iron Compact Fittings
- H. AWWA 206: Field Welding of Steel Water Pipe
- I. AWWA C207: Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In.
- J. AWWA 606: Grooved and Shouldered Joints
- K. ANSI/AWWA C900-2016: Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 60 In., for Water Distribution.
- L. ANSI/AWWA C901: Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, 1/2 inch through 3 inch, for Water.
- M. ASME/ANSI B16.1: Cast Iron Pipe Flanges and Flanged Fittings
- N. ASME/ANSI B16.3: Malleable Iron Threaded Fittings
- O. ASME/ANSI B16.21: Nonmetallic Flat Gaskets for Pipe Flanges
- P. ASTM A53: Pipe, Steel, Black and Hot Dipped Zinc Coated, Welded and Seamless
- Q. ASTM A536: Ductile Iron Castings
- R. ASTM D1330: Rubber Sheet Gaskets
- S. ASTM D1784: Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- T. ASTM D1785: Polyvinyl Chloride (PVC) Plastic Pipe Schedules 40, 80, and 120
- U. ASTM D2000: Rubber Products in Automotive Applications
- V. ASTM D2464: Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
- W. ASTM D2466: Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
- X. ASTM D2467: Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
- Y. ASTM D2564: Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems

- Z. ASTM D2855: Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
- AA. ASTM D3034: Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- BB. ASTM D3139: Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
- CC. ASTM D3212: Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- DD. ASTM D5162: Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates
- EE. ASTM F437: Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
- FF. ASTM F439: Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
- GG. ASTM F493: Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
- HH. ASTM F441: Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
- II. ASTM F477: Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- JJ. ASTM F493: Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
- KK. ASTM F679: Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
- LL. ASTM F2164: Field Leak Testing of Polyethylene (PE) Pressure Piping Systems using Hydrostatic Pressure
- MM. Idaho Standards for Public Works Construction, latest edition
- NN. AWWA C200: Steel Water Pipe

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300 of these specifications.
- B. Submit manufacturer's certification, that pipe and fittings meet or exceed specified requirements.
- C. Submit manufacturer's installation instructions.
- D. Submit shop drawings showing accurate dimensions of pipe, valves, fittings,

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PIPE AND PIPE FITTINGS

pumps, and appurtenances for all pump face piping. Submit calculations verifying that the system can withstand all pipe system forces.

1.4 QUALITY ASSURANCE

- A. All welders and welding operators shall be qualified by an ASME-approved testing laboratory before performing any welding under this section. Qualification tests shall be in accordance with Section IX, Article III of the ASME Boiler and Pressure Vessel Code. Welders and welding operators shall be qualified for making groove welds in Type 316L stainless steel pipe in position 6G for each welding process to be used.
- B. Qualification tests may be waived if evidence of prior qualification is deemed suitable by the Engineer. The manufacturer or Contactor shall retest any welders at any time the Engineer considers the quality of the welder's work substandard. When Engineer requests the retest of a previously qualified welder, the labor costs for the retest will be at the Owner's expense if the welder successfully passes the test. If the welder fails the retest, all cost shall be at the manufacturer's or Contractor's expense, including any rework required due to substandard work.

1.5 PROJECT RECORD DOCUMENTS

- A. Accurately record actual location of constructed pipe lines in relation to existing benchmarks.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Unload, store and load pipe in a manner that prevents shock, damage or excessive exposure to sunlight and weather.
- B. Coated pipe shall be shipped on padded bunks with nylon belt tiedown strips or padded banding.

1.7 WARRANTY

- A. Warranty: Include coverage of all pipe and pipe fittings.

PART 2 - MATERIALS

2.1 GENERAL

- A. Piping material specifications are as described herein. Pressure class rating and pipe stiffness requirements are specified on the piping schedule or identified on the plans.
- B. Interior pipe and fittings shall be as called out on the Plans, or if not called out, shall satisfy the requirements of the Uniform Plumbing Code (latest edition) and all other applicable state and local regulations.

- C. All piping materials, fittings, solvents, primers, welds, or other appurtenances used for potable water applications must comply with NSF 61 and certified Lead-Free.

2.2 APPENDICES

A. Appendix A – Piping Data Tables

1. PVC-G-1
2. PVC-G-2
3. PVC-G-3
4. PVC-P-1
5. PVC-P-2
6. PVC-P-3
7. CPVC-P-1
8. HDPE-P-1
9. HDPE-P-2
10. PP-G-1
11. DI-P-1
12. ST-P-1
13. SST-P-1

B. Appendix B – Fitting Data Tables

1. DI-F-FL
2. DI-F-M
3. DI-F-G
4. GSKT
5. CPLG
6. CPLG-FLX-1
7. CPLG-QC

2.3 PVC PIPE AND FITTINGS

A. Gravity PVC Pipe and Fittings

1. Less than or equal to 8-Inch Pipe: PVC-G-1

2. 4- through 15-Inch Pipe: **PVC-G-2**
3. 18- through 48-Inch Pipe: **PVC-G-3**
- B. Pressure PVC Pipe and Fittings
 1. Less than or equal to 8-Inch Pipe: **PVC-P-1**
 2. 4- through 12-Inch Pipe: **PVC-P-2**
 3. 14- through 36-Inch Pipe: **PVC-P-3**
- 2.4 CPVC PIPE AND FITTINGS
 - A. Less than 8-Inch Pressure Polyvinyl Chloride (CPVC) Pipe: **CPVC-P-1**
- 2.5 POLYETHYLENE PIPE AND FITTINGS (PRESSURE SERVICE)
 - A. Less than or equal to 3-Inch Pipe: **HDPE-P-1**
 - A. 4-Inch Through 36-inch Pipe: **HDPE-P-2**
- 2.4 DUCTILE IRON PIPE AND FITTINGS (INCLUDING GLASS LINED DUCTILE)
 - A. Pipe and Joints: **DI-P-1**
 - B. Fittings:
 1. Flanged Fittings: **DI-F-FL**
 2. Mechanical Joint Fittings: **DI-F-M**
 3. Grooved Fittings: **DI-F-G**
 - D. Gaskets: **GSKT**
 - E. Ductile Iron Wall Spools and Sleeves:
 1. Wall spools shall incorporate a statically cast thrust collar ring, which is positioned to accommodate cast-in-place concrete placement, as shown on the plans.
 2. ANSI/AWWA C110, Ductile iron with connecting end type compatible with connecting piping and valving and coordinated with shop drawings and plan requirements.
 3. Minimum lay length 24 inches or as shown on drawings. 350 minimum working pressure.
 - F. Coatings (exterior of pipe):
 1. **Buried:** Exterior coated with asphaltic coating. ANSI/AWWA C151/A21.51 and ANSI/AWWA C110/A21.10; 1 mil.
 2. **Submerged, Exposed or Embedded:** Primed and painted in accordance with Section 09900

- G. Linings (Interior): as required per **DI-P-1** data table and pipe schedule.
- 2.5 STEEL PIPE AND FITTINGS
 - A. Steel Pipe and Fittings and Joints: **ST-P-1**
- 2.6 GALVANIZED STEEL PIPE AND FITTINGS
 - A. Galvanized Steel Pipe and Fittings: ASTM A53, Type S, Grade B, Schedule 40, galvanized.
 - B. Joints: Threaded or flanged, as required.
 - 1. Threaded fittings shall be Class 150 galvanized malleable iron, conforming ANSI B16.3.
 - 2. Flanged fittings shall be hub style, slip-on in accordance with AWWA C207, Class D. Flat faced or raised face to be compatible with connecting piping, ANSI B16.1 Standard.
 - 3. Gasket: **GSKT**
- 2.7 CORRUGATED POLYPROPYLENE PIPE AND FITTINGS (GRAVITY SERVICE)
 - A. 12-Inch Through 60-inch Pipe: **PP-G-1**
- 2.8 STAINLESS STEEL PIPE AND FITTINGS:
 - A. Pipe: **SST-P-1**
 - B. Gaskets: **GSKT**
 - C. Fittings and Joints: See **SST-P-1** Data sheet for standards, fabrication, finishing and handling requirements.
- 2.9 COPPER PIPE (COMPRESSED AIR)
 - A. Type L or M hard drawn copper. Wrought copper fittings with 95/5 (no lead) solder. Couplings for copper pipe may also be restrained mechanical joint.
- 2.10 PIPE PENETRATION SEALS:
 - A. All Penetration Seals shall be "Link Seal Type S", as manufactured by Thunderline Link-Seal or approved equivalent.
 - 1. Seal Element Material: EPDM synthetic rubber; ASTM D2000 M3 BA 510
 - 2. Hardware shall be 316 SS
 - 3. Seal shall be watertight
 - 4. Seal size shall accommodate inlet piping and sleeve opening
 - 5. Backfill remaining annular space with non-shrink, waterproof grout.

- B. Manhole adaptors as called out on the Plans shall be KOR-N-SEAL as manufactured by NPC, Inc. or approved equivalent.
 - 1. Seal shall provide a flexible watertight seal of the pipe to the manhole or concrete structure. No adhesives or lubricants shall be employed in the installation of the connector into the manhole.
 - 2. All hardware shall be stainless steel. Stainless steel elements of the connector shall be totally non-magnetic Series 304 Stainless, excluding the worm screw for tightening the steel band around the pipe which shall be Series 305 Stainless. The work screw for tightening the steel band shall be torqued by a break-away torque wrench and set for 60-70 inch/lbs.
 - 3. The connector shall be of a size specifically designed for the pipe material and size being
- 2.11 PIPE COUPLINGS: **CPLG**
- 2.12 FLEXIBLE PIPE (EXPANSION) COUPLINGS: **CPLG-FLX-1**
- 2.13 QUICK CONNECT COUPLINGS: **CPLG-FLX-2**
- 2.14 AGGREGATE
 - A. Reference Section 02324 of these Specifications.
- 2.15 THRUST BLOCKS
 - A. Concrete for thrust blocks shall conform to Section 03300 of these Specifications.
- 2.16 HARDWARE
 - A. Unless otherwise shown or specified:
 - 1. all buried nuts, bolts, and washers shall be zinc plated for corrosion protection;
 - 2. exposed, embedded, or submerged nuts, bolts, and washers shall be 304 stainless steel.
 - 3. Mechanical joint T-bolts shall be lugged (Corten-style). All bolts shall be manufactured in accordance with ANSI/AWWA C111/A21.11.
 - 4. During assembly of interior piping, provide never-seize lubricant on all bolt threads.
 - B. Stainless Steel Pipe Systems Bolting:
 - 1. Flanged Joints: Type 316 stainless steel. ASTM A193, Grade B8M hex head bolts and washers; Grade B8M hex head nuts, or equivalent. Coordinate bolt length to meet flange and device requirements.
 - 2. Grooved Joints: Type 316 stainless steel. Grade B-8M, Class 2; coupling manufacturer's standard size and shapes.

2.17 VALVE BOXES

- A. Provide adjustable cast iron valve boxes and lid, as shown on the plans.
- B. Provide PVC plastic valve lid insert (beneath the lid) to retain gravel and debris from entering the valve box.

2.18 PIPE SADDLES

- A. Ford Style FC202 with double strap stainless steel band and fusion epoxy coated body or approved equivalent.

2.19 PIPE SUPPORTS

- A. General: Pipe supports shall be properly sized and located to accommodate design loads including seismic, thrust, wind, thermal expansion, lateral and longitudinal sway bracing.
- B. Offset Pipe Clamps:
 - 1. Materials: Type 316 stainless steel clamps and fasteners.
 - 2. Nominal Pipe Sizes: Supports 1/2-inch to 12-inch.
 - 3. Mounting Surface: Concrete wall or floor slab.
 - 4. Quantities and Spacing: As a minimum, install where required per design load and manufacturer's specifications, and where shown otherwise on the Drawings.
 - 5. Manufacturer and Model: Eaton B-Line Series, Figure B3148, or equal.
- C. Flanged Pipe Support:
 - 1. Materials: Type 316L stainless steel including flange mount, pipe stand, base, and bolting hardware.
 - 2. Nominal Pipe Sizes: Supports 4 to 36 inches.
 - 3. Mounting Surface: Concrete floor slab. Level base plate by backfilling void space with non-shrink waterproof grout, minimum 1-1/2 inches and maximum 2 inches thick, edges finished at 45-degree angle around perimeter of base plate.
 - 4. Flanged Bolt Pattern: Drilled for cast iron 125-pound per ASME B16.1.
 - 5. Quantities and Spacing:
 - a. Minimum of one support per valve located on horizontal pipe runs.
 - b. Additional supports as required per design load and manufacturer's specifications.
 - c. Where shown otherwise on the Drawings.

6. Manufacturer and Model: Eaton B-Line Series, Figures B3088T, B3089, and B3094, or equal.

- B. Contractor shall be responsible for designing code required seismic attachments, braces, and anchors to the structure for elements of the piping and mechanical Work in accordance with IBC (Current Edition) and ASCE-7 unless a design is specifically provided within the Contract Documents.

2.20 LOCATING WIRE AND MARKING TAPE

A. Locating Wire:

1. Locating wire used in open trench construction shall be #12 AWG high strength copper clad steel with minimum 450 lb. break load. Wire shall be insulated with high density polyethylene (HDPE) insulation intended for direct bury. Minimum thickness shall be 30 mil. Insulation shall be color coded per APWA standards for the specific utility being marked.
2. Wire connectors shall be specifically manufactured for use in underground locate wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion and shall be installed in a manner so as to prevent any uninsulated wire exposure. Non-locking friction fit, twist on, or taped connectors are prohibited.
3. Contractor shall demonstrate correct installation to the engineer by performing a locate/conductivity test.

B. Marking Tape:

1. Material: 75 mm (3 inch), 4 mil polyethylene. Provide green tape for non-potable water lines and blue tape for potable water lines.
2. Labeling: Label marking tape with the designated pipe use listed in the pipe schedule in 1-1/2 inch minimum black lettering.

2.21 PIPE INSULATION

- A. Match existing insulation where connecting to existing systems.
- B. Protection Against Freezing: All exposed exterior digester gas piping shall be provided with electric heat tape and covered with 2" thickness pre-molded glass fiber covering with all-service jacket. Cover pipe insulation with aluminum jacket, lapped 2" at sides and ends, secured with waterproof seal coating at all laps and aluminum circumferential bands.
- C. Glass Fiber Pipe Insulation: Glass fiber meeting ASTM C547, rigid molded. "K" value 0.23 at 75 °F. Maximum service temperature, 850 °F. Jacket shall be high density, white Kraft bonded to aluminum foil for vapor barrier, reinforced with fiberglass yarn, permanently treated, secured with self-sealing longitudinal laps and butt strips or AP jacket with outward clinch expanding staples coated with vapor barrier mastic.
 - 1. Manufacturer: Johns Manville "Micro-Lok AP-T Plus," Owens-Corning ASJ/SSLII or Knauf Fiber Glass "Pipe Insulation", or equal.
- D. Field Applied Jackets:
 - 1. Canvas Jacket: UL listed fabric, 6 oz./sq.yd. plain weave cotton treated with dilute fire-retardant lagging adhesive.
 - 2. PVC Plastic: One-piece molded type fitting covers and jacketing material, gloss white. Connections, tacks, pressure sensitive color matching vinyl tape.
 - a. Manufacturer: Zeston 2000 or Knauf Fiber Glass "Proto Fitting Covers", or equal.
 - 3. Jacketing of Pipes Exposed to Weather: Piping shall be finished with an aluminum jacket over the insulation. Aluminum jacket material shall be embossed or corrugated sheet, 0.016" nominal thickness, conforming to ASTM B209, temper H-14. Jacketing shall be applied with joints lapped not less than 2", and shall be secured with 3/8" x 0.020" thick aluminum bands located at each circumferential lap and not at not more than 9" intervals throughout. Horizontal joints shall lap downward to shed water. Vertical joints shall be sealed with weatherproof silicone sealant.
 - a. Manufacturer: Childers or Pabco manufacturer, or equal.
 - 4. Interior Insulated Pipe Jacketing: Pre-impregnated canvas, wetted and smoothed in place.
 - a. Manufacturer: Great Lakes Textiles Product Style 1979, or equal.
 - 5. Jacketing of Underground Cellular Glass Pipe: Jacketing shall be precut to fit the contour of the surface to which it is to be applied. Precut sections shall allow for 2-inch overlap. All laps shall be sealed with a glove coat of manufacturer's seal coat.

a. Manufacturer: Pittsburgh Corning "PITTWRAP" with "PITTCOATE 300" or equal.

6. Butt Straps: Materials shall be identical in all respects and appearance to the basic jacket material.

2.24 DIELECTRIC UNIONS AND INSULATING FLANGES

A. Dielectric unions or insulating flanges shall be used to separate all dissimilar metal pipe connections and wherever buried ferrous metal pipe transitions to above grade.

2.25 LUBRICANTS

A. Pipe lubricants shall be supplied by the approved pipe supplier. No substitutes for lubricants from other manufacturers are acceptable.

B. Equipment lubricants shall be supplied by the approved equipment supplier. Refer to Section 11000 – General Requirements for Equipment.

PART 3 - EXECUTION

3.1 GENERAL

- A. Pipe shall be installed in accordance with good trade practice and in strict accordance with the manufacturer's instructions. The methods employed in handling and placing of pipe, fittings and equipment shall be such as to insure that after installation and testing they are in good condition.

3.2 EXAMINATIONS

- A. Verify excavation under provisions of Section 02324.
- B. Verify that excavation will allow a minimum pipe cover as shown on the Plans and described elsewhere in the Specifications. If existing pipelines are less than minimum cover, connect to existing pipeline and angle pipe, as necessary, to achieve cover requirements.
- C. Verify that excavations are to required alignment, grades, dry, and not over-excavated.
- D. Examine pipe and fittings for defects or damage.
- E. Verify all pipe, fittings, aggregate, and all materials delivered to the site meet the requirements of these Technical Specifications.
- F. Examine existing piping locations and structures where connections are to be made.
- G. Verify equipment locations and make modifications in piping to properly connect to equipment as necessary, prior to fabrication.

3.3 EXTERIOR PIPE INSTALLATION

- A. Remove all water from excavation.
- B. Install pipe in accordance with the manufacturer's recommendations.
- C. Utilize proper tools for cutting and beveling pipe ends and joining pipe using manufacturer's recommended tools designed for this task.
- D. Clean and prepare pipe joint using manufacturer's recommended gasket and lubricant.
- E. Utilize proper tools to complete joint, assuring that plain end is inserted "home" in the bell.
- F. Assure that no dirt or other foreign material is allowed in pipeline. Plug all pipe ends with water tight plugs when leaving the pipe unattended.
- G. Complete trenching and backfilling for utilities in accordance with Section 02324.
- H. Install pipe fittings so a constant alignment and level grade is achieved through all the pipe and fittings.

- I. Install pipelines to the alignments and grades shown on the Drawings.
- J. Restraining Buried Pipe
 1. Provide restrained joints (unless otherwise noted on the plans or specified) at all buried piping tees, branches, bends, valves, plugs, reducers, dead-end lines, and other items (when noted).
 2. Thrust blocks shall be provided where shown on the plans and shall be in addition to mechanical joint restraint.
 3. Place thrust blocking only where shown or specified so that it extends from fitting into solid undisturbed earth wall.
 4. Restrain joints within minimum distance from restrained fitting joints as in the table shown below.
 5. Pipe straight coupling joints shall be mechanically restrained unless the requirements for soil/backfill friction length are provided on both sides of the joint. Provide external restraint harness, Romac Series 600, or approved equal to provide longitudinal restraint with vertical joint flexibility.

Pipe Size (inches)	Length of Restrained Pipe (feet) on Each Side of Bend or Valve		
	Fitting Angle		Valve or Dead End
	0° to 45°	46° to 90°	
6	6	17	29
8	9	21	38
10	11	24	45
12	12	29	53
16	15	38	69
18	17	41	77
20	18	45	84
24	21	53	98

- a. Listed lengths are based on a test pressure of 150 psi. To compute the length for a different test pressure use the following equation:

$$Length = \left(\frac{Test\ Pressure}{100} \right) \left(\frac{Table\ Value}{1.5} \right)$$

- b. Listed lengths assume a well graded aggregate with little to no fines. If conditions are different, verify restraining lengths with supplier.
- c. Listed lengths are based on 4-foot of bury.
- d. Install insulating components where dissimilar metals are joined together.

- K. Properly align pipe perforated slots in trench.
- L. Enter and exit through structure walls, floors, and ceilings by using penetrations and seals as shown on the Drawings.
- M. Pipes passing beneath or through structure footing/foundations shall have a double flexible pipe coupling with longitudinal restraint at each location where a pipe leaves or passes out from beneath a structure to accommodate potential differential settlement between the structure and pipe, typical. Reference project standard details.

3.4 NATURAL GAS PIPING INSTALLATION

- A. Install dirt legs at lowest end of run where pipe changes elevation and in accordance with local gas codes.

3.5 PLUMBING INSTALLATION: WATER AND DRAIN PIPING

- A. Install horizontal runs at a minimum slope of 1/8-inch per foot, unless noted otherwise, and in accordance with local plumbing codes.

3.6 INTERIOR PIPING INSTALLATION

- A. All pipe shall be secured in place by use of blocking, hangers, brackets, clamps or other approved methods, and the weight thereof shall be carried independently of equipment. Special hangers and supports shall be as shown on Standard Details or as on the Drawings. Install anchors and supports as necessary to properly support pipe against all static, dynamic, and vibratory loads. Proper workmanship on all supports shall include grinding and deburring of sharp edges on all fabrications. Contractor shall submit shop drawings and calculations for proposed pipe support system.
- B. Design generally accepted as exemplifying good engineering practice, using stock or production parts, shall be utilized wherever possible.
- C. Provide floor stands, wall bracing, concrete piers, etc., for all lines running near the floors or near walls and which can be properly supported or suspended by the walls or floors. Pipelines near concrete or masonry walls may also be hung by hangers carried from wall brackets at a higher level than pipe. Hanging of any pipe from another is prohibited.
- D. Equipment shall be so positioned and aligned that no strain shall be induced within the equipment during or subsequent to the installation of pipe work.
- E. In erecting the pipe, a sufficient number of screwed unions or flanged joints shall be used to allow any sections or run of pipe to be disconnected without taking down adjacent runs.
- F. Flexible couplings and field flanges shall be installed where shown on the Drawings and at such other points as may be required for ease of installation or removal of the pipe, subject to approval of the Engineer. Flexible couplings shall

be of the positive lock type (or with restraint rods) where necessary to prevent separation of pipe due to internal pressures.

G. Installation at Concrete Walls and Fittings:

1. Whenever a pipeline of any material terminates at, or extends through, a structural wall or sump, the Contractor shall install, in advance of pouring of concrete, the fittings or special casting required for the particular installation.
2. Ductile iron or steel pipe to be cast in water bearing walls, or more than two feet below grade, shall have seep rings.

H. Install pipe connectors in strict accordance with the recommendation of the connector manufacturer.

I. Compressed Air (Instrument Air) Piping Installation:

1. Routing of instrument air piping is the responsibility of the Contractor in conformance with Contract Documents.
2. Provide isolation ball valves at all branch lines, and at each instrument.
3. Provide fittings, pipe hangers, brackets, clamps, dielectric unions, etc. as necessary to route piping to point of use.
4. Contractor is required to cross-reference the locations of instruments requiring instrument air-piping.
5. Contractor is required to provide adequately sized piping/tubing as required to operate the instruments on each branch line. ½" diameter minimum for a line serving a single instrument; 1" dia. minimum or larger for any line serving two or more instruments.
6. Contractor shall route tubing such that access to valves, process piping, equipment and electrical components is not limited, or obstructed.
7. Air-flush all lines prior to connection to instruments.
8. Provide copper pipe materials per this Section.

3.7 INSULATION INSTALLATION, PIPING

A. General: Pipe insulation shall be continuous and installed on all fittings and appurtenances unless specified otherwise. Installation shall be with full-length units of insulation and using a single-cut piece to complete a run. Provide jackets for all pipe insulation.

1. Locate insulation and cover seams in least visible locations.
2. Do not apply insulation to connections, joints, welds, flanges, or screwed joints until pipe tests are completed.

3. Do not apply insulation over flanged joints until piping has been brought up to operating temperature and flange bolts have been fully tightened.
 4. Neatly finish insulation at supports, protrusions, and interruptions.
 5. Provide insulated dual temperature with vapor retardant jackets with self-sealing laps. Insulate complete system.
- B. Joints: Joints shall have adjacent sections tightly butted with jackets drawn tight and smoothly cemented down on all longitudinal and end laps. Jacket longitudinal laps shall overlap by at least 1-1/2". Butt joints shall be sealed with pressure-sensitive vapor barrier tape.
1. Jacket laps, butt strips, and exposed ends of insulation shall be cement sealed using either adhesive or factory-applied, self-sealing system. Jacket laps shall be smooth and without fishmouths.
- C. Laps: Self-sealing laps (1-1/2" minimum) and butt strips (3" minimum width) shall be used for sealing insulation joints. Staple with outward clinching staples on 4" centers on side laps and 4" on centers to both butted jackets for butt strips. If any open gaps occur, add staples and lagging adhesive or replace jacket totally.
1. For cold applications, provide lagging adhesive on all staples.
- D. Flexible Elastomeric Closed-Cell Insulation: Insulation shall be tubular form. Sweat fittings shall be insulated with miter-cut pieces the same size as on adjacent piping. Screwed fitting covers fabricated from miter-cut pieces and shall be overlapped and sealed to the adjacent pipe insulation using Armstrong No. 520 adhesive.
- E. Insulation Support at Hangers:
1. Provide support shield and 360 degrees between support shield and piping on piping 1-1/2" diameter and larger. Fabricate hydrous calcium silicate or other heavy density insulating material suitable for the temperature. Shield shall be fabricated of 14 gauge galvanized sheet metal. Insulation shields and inserts shall be not less than the following lengths.

1-1/2" to 2-1/2" pipe size	10" long
3" to 6" pipe size	12" long
8" to 10" pipe size	16" long
12" and larger	22" long
 2. Vapor-barrier facing of the insert shall be of the same material as the facing on the adjacent insulation. Seal inserts into the insulation with lagging adhesive for vapor seal. Where anchors are secured to insulated chilled piping, insulate anchors same as piping for a distance not less than

four times insulation thickness to prevent condensation. Vapor seal insulation.

- F. Sleeves and Wall Chases: Insulation on pipes through walls and floors shall be full size and jacketed same as adjacent insulation. Provide a metal jacket over the insulation on pipe passing through sleeves in non-fire rated walls where caulking is required.
 - 1. Where penetrating interior walls, extend the metal jacket 2 inches out on either side of the wall and secure on each end with a band.
 - 2. Provide adequate support on vertical pipe to prevent slipping.
- G. Interior Insulated Piping and Fittings within 10 Feet of any Floor: Surface shall be protected by smooth sheet aluminum jacket material, 0.016" nominal thickness, lapped, banded, and installed same as above.

3.8 THRUST BLOCKS

- A. Place thrust blocks at each elbow, tee, cross, and gate valve installed underground when shown or specified.
- B. Provide bearing area against undisturbed earth.
- C. Place thrust blocks such that fitting can be removed at a later date without damage to the pipeline.
- D. Place 6 mil Visqueen plastic between thrust block and fitting.
- E. Place concrete so no concrete touches the nuts and bolts of the fitting or valve, and the nuts and bolts can be removed and replaced without removing any concrete.
- F. Thrust Block: Sizes are shown on the Plans.

3.9 CLEANING AND FLUSHING

- A. Remove all construction debris from piping prior to pressure testing. Flush all piping at a minimum velocity of 2.5 fps following pressure testing and dispose of water per local, state, and federal requirements.

3.10 PRESSURE TESTING

- A. Refer to piping schedule for pipelines which will be pressure tested, the testing pressure, and testing method.
- B. Assure that trench is properly backfilled and thrust blocking has cured to a degree that will allow pressure testing without damage, or pipe/fitting movement.

C. Hydrostatic Tests

1. Fill pipe with water to the pressure shown on piping schedule. Expel all air.
2. Verify that, in a two-hour (2) test, the pipe does not leak in excess of the allowable leakage, as defined by the following formula in which Q is the allowable leakage in gallons per hour.

$$Q = \frac{LD\sqrt{P}}{148,000}$$

Where:

Q = allowable leakage (gallons per hour)

L = length of pipe section being tested (feet)

D = nominal pipe diameter (inches)

P = average test pressure during the hydrostatic test (psi)

3. Pressure test HDPE pipe per ASTM F2164-02 "Field Leak Testing of Polyethylene (PE) Pressure Piping Systems using Hydrostatic Pressure".

D. Pneumatic Tests: Per ISPWC Section 501 – Gravity Sewers.

E. Certify test results meet these specifications for Section 01300.

3.11 DEFLECTION TESTING

- A. Deflection test all flexible pipelines no sooner than 30 days after trench backfill and compaction is completed. Unless otherwise provided in the Contract, Contractor to bear costs associated with completing surface repair or other work prior to all required testing. The maximum allowable deflection is to be 5.0% of the nominal pipe diameter.
- B. Provide test mandrels with a diameter at least 95% of the actual inside diameter (ID) of the pipe. For pipes with controlled outside diameter, calculate the actual ID of the pipe by taking the average outside diameter (OD) as set by the ASTM standard and subtracting two (2) times the minimum wall thickness as set by the ASTM standard. For pipes with controlled inside diameter, use the ID set by the ASTM standard.
- C. Pull the appropriate mandrel through the pipe using one of the following methods:
 - 1. Pull the mandrel through the pipe by hand. If the pipe will not allow the mandrel to pass, repeat the test from the opposite direction to determine the limits of failure.
 - 2. As a part of the CCTV inspection, where required, pull the mandrel through the pipe by connecting it in front of the CCTV camera lens at a distance equal to the camera's focal length. Notify Engineer of time and date of test at least 24 hours prior to testing to allow for Engineer, at Engineer's discretion, to witness test. Provide tag line to reverse mandrel and camera should mandrel fail to pass through line. Perform test as a separate step from the CCTV inspection, where required, thus a separate VHS tape record must be made of the mandrel test. Clearly mark tape identifying project name, mandrel test, and the pipe will not allow the mandrel to pass, repeat the test from the opposite direction to determine the limits of failure.
- D. Uncover and, if required by the Engineer, remove and reinstall new pipe sections for reaches with excessive deflection or recompact bedding if, in the opinion of the Engineer, existing pipe is not damaged. Retest pipe after any repair work is completed. Do not reinstall damaged pipe.
- E. Use a "Go-Nogo" pin gauge instead of a mandrel if "Insta-Tap" tee fittings are used for service connections. Use test diameter per paragraph 3.8.B.

- F. The Owner may conduct additional deflection testing prior to expiration of the warranty period. Uncover and reinstall sections of the pipe found to have excessive deflection. Do not reinstall damaged pipe.

3.12 LOCATING WIRE AND MARKING TAPE

- A. Place locating wire and marking tape at the locations shown on the plans for the entire length of a pipeline. Repair all cuts and splices in accordance with the manufacturer's recommendations. Assure continuity of all locating wire before submitting final payment. Payment will not be made for pipe where the locating wire does not have electrical continuity.

3.13 DISINFECTION OF POTABLE WATER LINES

- A. Provide disinfection of potable water main in accordance with Section 02516.

3.14 CONNECTIONS TO EXISTING MAINS

- A. Expose existing main and verify line size and type of pipe.
- B. Provide the necessary fittings that comply with these Specifications and connect to the existing main. Properly align pipe to interface with existing pipeline so no unusual stresses are applied to the pipe.
- C. Maximum allowable pipe gap at compression couples is one-half (1/2) inch maximum.

3.15 PIPE SCHEDULE

- A. The Pipe Schedule is included on the Plans.

3.16 TOLERANCES FOR SEWER INTERCEPTOR INSTALLATION

- A. The sewer interceptor pipe slope shall conform to the slope set forth in the plans. For each pipe segment, the minimum slope shall be 0.046% and the maximum slope shall be 0.10%. Reverse slope on gravity pipe is prohibited. Manhole flow channels that pond water are unacceptable. Line segments and manholes not meeting these tolerances shall be rejected and replaced at the Contractor's expense.
- B. The horizontal alignment of the pipeline shall conform to +/- 1-foot from true alignment shown on the plans. The pipeline shall also maintain the separation distance requirement from potable water lines shown on the Contract Documents. Line segments not meeting these tolerances and/or requirements shall be rejected and replaced at the Contractor's expense.
- C. The Contractor shall conduct quality control surveys, at each manhole and as needed throughout sewer interceptor installation, to ensure that project requirements and tolerances are satisfied. Engineer shall survey each manhole to

determine if tolerances were satisfied within one working day of installation (assuming Monday through Friday construction) for quality assurance purposes only. Contractor shall provide a minimum 48-hour advance written notice to the Engineer for survey request.

APPENDIX A

Pipe Specification Data Tables

GRAVITY PVC PIPE

Less than or equal to 8-Inch Pipe

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL	
Less than or equal to 8-Inch Gravity PVC Pipe		<i>PVC-G-1</i>	
PIPING MATERIAL		JOINTS	
Schedule/DR	40	Joint Type	Solvent Weld Joint
Material Std.	ASTM D1785, Type 1	Pipe Joint Std.	ASTM D2855
Pressure Rating/Class	220 psi	Solvent Weld Cement Std.	ASTM D2564
		GASKETS	
		Gasket Type	
		Gasket Std.	
		FITTINGS	
		Fitting Material	PVC
		Fitting Material Std.	ASTM D1784
		Fittings Std.	ASTM D2466
NOTES			
- For gravity piping less than 8-inch beneath structures, piping shall be Schedule 40 PVC conforming to ASTM D1784 and associated fittings, unless otherwise noted. - Fittings as noted on the Contract Drawings. - Fabricated fittings are not permitted. - FNPT fitting shall have external SS reinforcing band. - Solvent welds shall use solvent cement that conforms to ASTM D2564 and solvent primer.			

GRAVITY PVC PIPE
4- through 15-Inch Pipe

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL	
4- through 15-Inch Gravity PVC Pipe		PVC-G-2	
PIPING MATERIAL		JOINTS	
Schedule/DR/SDR	SDR 35 (PS 46) unless otherwise noted.	Joint Type	Integral Bell Gasket
Material Std.	ASTM D3034, Cell Class 12454/12364	Pipe Joint Std.	ASTM D3212
		GASKETS	
		Gasket Type	Rubber, factory installed
		Gasket Std.	ASTM F477
		FITTINGS	
		Fitting Material	PVC, gasketed.
		Fitting Material Std.	ASTM D3034, SDR 18 Wall Thickness.
NOTES			
1. For gravity piping less than 8-inch beneath structures, piping shall be Schedule 40 PVC conforming to ASTM D1784 and associated fittings, unless otherwise noted.			

GRAVITY PVC PIPE
18- through 48-Inch Pipe

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL	
18- through 48-Inch Gravity PVC Pipe		PVC-G-3	
PIPING MATERIAL		JOINTS	
Schedule/DR/SDR	PS 46, unless otherwise noted.	Joint Type	Integral Bell Gasket
Material Std.	ASTM F679	Pipe Joint Std.	ASTM D3212
		GASKETS	
		Gasket Type	Rubber, factory installed
		Gasket Std.	ASTM F477
		FITTINGS	
		Fitting Material	PVC, gasketed.
		Fitting Material Std.	ASTM D3034, SDR 18 Wall Thickness.
NOTES:			

PRESSURE PVC PIPE
Less than or equal to 8-Inch Pipe

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL	
Less than or equal to 8-Inch Pressure PVC Pipe		<i>PVC-P-1</i>	
PIPING MATERIAL		JOINTS	
		Joint Type	Solvent Weld Joints
Schedule/DR/SDR	Schedule 80	Pipe Joint Std.	ASTM D2855
Material Std.	ASTM D1785, Type 1, Grade 1	GASKETS (FL Joints)	
Pressure Rating/Class	220 – 810 psi (see standard)	Gasket Type	EPDM
		FITTINGS	
		Fitting Material	PVC
		Fitting Material Std.	ASTM D1784
		Socket Fittings	ASTM D2467
		Threaded Fittings	ASTM D2464
NOTES			
1. Piping Shall be certified ANSI/NSF-61 lead free for potable water service applications. 2. Solvent weld or threaded fittings as noted on the Contract Drawings. 3. Fabricated fittings are not permitted. 4. FNPT fitting shall have external SS reinforcing band. 5. For non-chemical use; a. Solvent weld joints shall conform to ASTM D2855. Solvent welds shall use solvent cement that conforms to ASTM D2564 and solvent primer shall be NSF 61 approved when in potable water applications. 6. For chemical service: a. Solvent weld joints shall conform to ASTM D2855. Solvent welds shall use IPS 724 solvent cement, or an equivalent solvent cement that conforms to ASTM F493, and solvent primer, and shall be suitable and compatible for the chemical being conveyed in the specific process piping. b. Submit product information and chemical compatibility. 7. Clear PVC (when called-for on the plans) shall be UV resistant SCH. 80, "Near Water Clear" as manufactured by Harvel, or approved equal.			

PRESSURE PVC PIPE
4- through 12-Inch Pipe

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL	
4- through 12-Inch Pressure PVC Pipe		PVC-P-2	
PIPING MATERIAL		JOINTS	
Class	CL 235	Joint Type	Bell and Spigot Ends
Schedule/DR/SDR	DR 18	Pipe Joint Std.	ASTM D3139
Grade			
Type of Service	Any fluid compatible with non-plasticized PVC		
Material Std.	ANSI/AWWA C900	GASKETS	
Pressure Rating/Class		Gasket Type	Rubber, factory installed
		Gasket Std.	ASTM F477
		FITTINGS	
		DUCTILE IRON FITTINGS, Reference Data Tables DI-F-FL, DI-F-MJ, DI-F-G, 3-Through 48-Inch	
NOTES			
1. Provide restrained joints on all ductile iron fittings and PVC push-on bells for buried PVC piping, unless otherwise noted in the Contract Drawings and pipe schedule. 2. Pipe joints (less than 12-inch) shall be mechanically restrained unless the requirements for soil/backfill friction length are provided on both sides of the joint. If friction length cannot be achieved, provide external restraint harness: a. Wedge action joint restraint glands shall be rated at 350 psi with a 2:1 safety factor. Gland shall be fusion bonded epoxy coated, minimum dry film thickness 20 mils. b. PVC Bell and Spigot Push-On Pipe: EBAA Iron, Inc. Series 1500, 1600, or 2800 Megalug or equivalent.			

PRESSURE PVC PIPE
14- through 36-Inch Pipe

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL	
14- through 36-Inch Pressure PVC Pipe		<i>PVC-P-3</i>	
PIPING MATERIAL		JOINTS	
Class	CL 235 or CL165 (Note 1)	Joint Type	Bell and Spigot Ends
Schedule/DR/SDR	DR 18 or DR 25 (Note 1)	Pipe Joint Std.	ASTM D3139
Grade			
Material Std.	ANSI/AWWA C900-2016	GASKETS	
Pressure Rating/Class		Gasket Type	Rubber, factory installed
		Gasket Std.	ASTM F477
		FITTINGS	
		Reference Data Tables DI-F-FL, DI-F-MJ, DI-F-G, 3-Through 48-Inch	
NOTES			
1. Pipe shall be CL 235/DR 18, unless specifically noted in plans or pipe schedule. 2. Furnish in cast-iron equivalent outside diameters. 3. Provide restrained joints on all ductile iron fittings and PVC push-on bells for buried PVC piping, unless otherwise noted in the Contract Drawings and pipe schedule. 4. Pipe joints (less than 12-inch) shall be mechanically restrained unless the requirements for soil/backfill friction length are provided on both sides of the joint. If friction length cannot be achieved, provide external restraint harness: a. Wedge action joint restraint glands shall be rated at 350 psi with a 2:1 safety factor. Gland shall be fusion bonded epoxy coated, minimum dry film thickness 20 mils. b. PVC Bell and Spigot Push-On Pipe: EBAA Iron, Inc. Series 1500, 1600, or 2800 Megalug or equivalent.			

PRESSURE CPVC PIPE
Less ½" through 8-Inch Pipe

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL	
½" through 8-Inch Pressure Chlorinated Polyvinyl Chloride (CPVC) Pipe		<i>CPVC-P-1</i>	
PIPING MATERIAL		JOINTS	
		Joint Type	Solvent Weld Joints
Schedule/DR/SDR	Schedule 80	Pipe Joint Std.	ASTM D2855
Material Std., Grade	ASTM F441, Type IV, Grade 1		
Pressure Rating/Class	Minimum pressure Rating of 250 psi @ 73.4 deg F. (8-inch).		
		GASKETS (FL Joints)	
		Gasket Type	EPDM
		Gasket Std.	ANSI B16.1
		FITTINGS	
		Fitting Material	ASTM D1784
		Socket Fittings	ASTM F439, injection molded type
		Threaded Fittings	ASTM F437
NOTES:			
1. Piping Shall be certified ANSI/NSF-61 lead free for potable water service applications. 2. Solvent weld or threaded fittings as noted on the Contract Drawings. 3. Fabricated fittings are not permitted. 4. FNPT fitting shall have external SS reinforcing band. 5. For non-chemical use; a. Solvent weld joints shall conform to ASTM D2855. Solvent welds shall use solvent cement that conforms to ASTM D2564 and solvent primer shall be NSF 61 approved when in potable water applications. 6. For chemical service: a. Solvent weld joints shall conform to ASTM D2855. Solvent welds shall use IPS 724 solvent cement, or an equivalent solvent cement that conforms to ASTM F493, and solvent primer, and shall be suitable and compatible for the chemical being conveyed in the specific process piping. b. Submit product information and chemical compatibility.			

POLYETHYLENE PIPE
Less than or equal to 3-Inch Pipe

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL	
Less than or equal to 3-Inch High Density Polyethylene (HDPE) Pipe		<i>HDPE-P-1</i>	
PIPING MATERIAL		FUSED JOINTS	
Type of Service	Water	Joint Type	Butt Heat Fusion or mechanical joint.
Schedule/DR/SDR	DR 9 minimum	Pipe Joint Std.	ASTM D3261
Material Std.	AWWA C901-17	Thermoplastic Materials Designation Code	PE 4710
Thermoplastic Materials Designation Code	PE 4710		
Pressure Rating/Class (min)	250 psi	MECHANICAL JOINTS	
		Fitting Material	All brass or stainless steel
		Threaded Fittings	Fittings shall have MNPT or FNPT iron pipe size threads.
NOTES			
1. Piping Shall be certified ANSI/NSF-61 lead free for potable water service applications. 2. Iron Pipe Size (IPS) outside diameter 3. Brass compression couplings or pack joints with stainless steel inserts, where specifically allowed on the Drawings. No joints are allowed beneath building slabs and foundations. a. Manufacturer shall be FORD, or Mueller or approved equal.			

POLYETHYLENE PIPE
4-Inch Through 36-inch

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL	
4-Inch Through 36-inch High Density Polyethylene (HDPE) Pipe		<i>HDPE-P-2</i>	
PIPING MATERIAL		JOINTS	
Class		Joint Type	Butt Heat Fusion
Schedule/DR/SDR	DR 11 (200 psi) Minimum, DR 9 (250 psi) when called-for in pipe schedule	Pipe Joint Std.	ASTM D3261
Sizing	Ductile Iron Pipe Size (DIPS) for use with Ductile Iron Fittings.		
Type of Service	Waterworks		
Material Std.	AWWA C906-15	GASKETS	
Thermoplastic Materials Designation Code	PE-4710	Gasket Type/Std.	Per data sheet DI-GSKT
		FITTINGS	
		Fitting Material	HDPE Butt Fused or DI Fittings
		Fitting Material Std.	See DI-F-M data sheet for use with Ductile Iron MJ fittings.
NOTES:			
1. Piping Shall be certified ANSI/NSF-61 lead free for potable water service applications.			

POLYPROPYLENE PIPE
(GRAVITY DRAINAGE SERVICE AND BURIED HVAC DUCT)
12-Inch Through 60-inch

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL	
12-Inch Through 60-inch High Density Polypropylene (PP) Pipe for Gravity Service (corrugated exterior, smooth interior)		<i>PP-G-1</i>	
PIPING MATERIAL		JOINTS	
Product: ADS Sani-Tite HP or approved equal	(per AASHTO) shall have a smooth interior and annular exterior corrugations. ASTM F2764, ASTM F2881 or AASHTO M330 Type D (triple-wall)	Fittings	Fittings shall conform to ASTM F2764. Bell and spigot connections shall utilize a welded or integral bell and valley or inline gaskets meeting the watertight joint performance requirements of ASTM D3212
12- through 60-inch pipe	Polypropylene compound for pipe and fitting production shall be an impact modified copolymer meeting the material requirements of ASTM F2764	Pipe Joint Std.	Pipe shall be joined using a bell & spigot joint. The joint shall be watertight according to the requirements of ASTM D3212. To assure watertightness, field performance verification may be accomplished by testing in accordance with ASTM F1417 or ASTM F2487 and in accordance with ISPWC.
		Gaskets	Gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly. 10- through 60-inch diameters shall have an exterior bell wrap installed by the manufacturer.
NOTES			
1.	Installation shall be in accordance with ASTM D2321 and mfr. recommended installation guidelines, with the exception that minimum cover in trafficked areas for 4- through 48-inch (100 to 1200 mm) diameters shall be one foot and for 60-inch (1500 mm) diameter the minimum cover shall be 2 ft. Submit additional product specific installation requirements.		
2.	When piping system is used for buried foul air or HVAC ductwork, provide additional leakage tests DIV 15 mechanical HVAC ductwork requirements.		
3.	Meets ISPWC requirements for gravity sanitary sewer applications.		

DUCTILE IRON PIPE

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL	
Ductile Iron Pipe		DI-P-1	
PIPING MATERIAL		JOINTS	
Pipe Thickness Std.	ANSI/AWWA C150/A21.50	Joint Type	Push-on Joints
		Pipe Joint Std.	ANSI/AWWA C111/A21.11
Mechanical, Grooved, or Push-On Joint Pipe		Joint Type	Mechanical Joints
Pressure Rating/Class	350 psi (See Note 1)	Pipe Joint Std.	ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11 OR ANSI/AWWA C153/A21.53 and ANSI/AWWA C111/A21.11
Material Std.	ANSI/AWWA C151/A21.51		
FLANGED PIPE SPOOLS		Joint Type	Flanged Joints - ANSI/AWWA C115/A21.15
Material Std.	ANSI/AWWA C115/A21.15		
Pressure Rating/Class	350 psi (See Note 1)	Joint Type	Grooved Joints - AWWA C606
FITTINGS			
Reference Data Sheets DI-F-FL, DI-F-M, DI-F-G			
GASKETS			
		Gasket Type	See GSKT data sheet.

NOTES

- Minimum thickness class shall be as follows:

Use	Required Class
General Use, 12" Diameter and Smaller	52
General Use, Over 12" Diameter	50 or 51
Threaded Taps	52
Grooving, for Grooved Joints	53
Threading, for Threaded Flanges	53
- Where taps are shown on fittings, tapping bosses shall be provided.
- Provide restrained joints on all buried ductile iron piping with push-on joints, unless otherwise noted in the Contract Drawings and pipe schedule.
- Provide mechanical restrained joints on all buried ductile iron piping, unless otherwise noted in the Contract Drawings and pipe schedule.
- Gray-iron threaded flanges shall not be permitted.
- Wedge action joint restraint glands shall be rated at 350 psi with a 2:1 safety factor. Gland shall be fusion bonded epoxy coated, minimum dry film thickness 20 mils.
 - DI Push-On Pipe: "Field-Lok" gaskets as manufactured by US Pipe and Foundry Co., or approved equal.
 - DI Mechanical Joints: EBAA Iron, Inc. Series 1100 Megalug or approved equivalent.
- No lining shall be provided on pipes used for air service.
 - Cement Mortar Lining Requirements for Ductile Iron Pipe and Fittings (potable water and wastewater):
 - Provide Cement Mortar Lined Pipe and Fittings unless otherwise noted on plans conforming to ANSI/AWWA C104/A21.4.
- Epoxy Lining Requirements for Ductile Iron Pipe and Fittings (wastewater service):
 - Ceramic epoxy
 - Protecto 401 (amine cured Novalac Epoxy), as manufactured by Pacific States Cast Iron Pipe Company
 - 40 mils nominal dry film thickness
- Glass Lining Requirements for Ductile Iron Pipe and Fittings

- a. The glass lining applied to pipe and fittings shall be vitreous material that is hard, smooth, continuous, and formulated to prevent the adherence of grease in sludge and scum lines, and to resist the adherence of crystalline metal salt deposits (Struvite and Vivionite) to sludge and centrate lines. It shall be applied to properly prepared pipe and fittings using accepted industry standards, and shall be tested per applicable standards, including ASTM D-5162-01, NACE RP 0188-99, and SSPC Coating Manual, Volume 1, Section XIV.
- b. Lining shall be VITCO SG-14, Fast Fabricators/Waterworks Manufacturing MEH-32, or approved equal.
- c. The applicator shall have a minimum of 5 years of successful experience in the application of high temperature glass and porcelain coatings.
- d. The lining material shall consist of vitreous and inorganic material applied to the internal surfaces that have been prepared by blasting. The lining shall be applied in a minimum of two (2) coats, separately applied and separately fired. The items shall be exposed to a maturing temperature of approximately 1400° F, at which point the vitreous and inorganic materials melt and fuse to the base metal, forming an integral molecular bond with the base metal surface. Subsequent coatings will be in similar manner, forcing an integral molecular bond with the base coat. The entire finished coating shall be a minimum of 10 mils (.010) and a maximum of 25 mils (.025") as tested with a micro test or other acceptable dry film thickness gauge. The finished lining shall be able to withstand a strain of 0.001 inch/inch (the yield point of the base metal) without damage to the glass.
- e. The lining shall have a hardness of 5-6 on the MOHS scale, and a density of 2.5-3.0 grams per cubic centimeter as measured by ASTM D-792. The glass lining shall be capable of withstanding an instantaneous thermal shock of 350° F. differential without crazing, blistering or spalling. It shall be resistant to corrosion of between PH-3 and PH-10 at 125° F. There shall be no- visible loss of surface gloss to the lining after immersing a production sample in an 8 percent sulfuric acid solution at 148° F for a period of 10 minutes. When tested according to ASTM C-283, it shall show a weight loss of not more than 3 milligrams per square inch.
- f. The glass lining shall be tested by "low voltage, wet sponge, non-destructive holiday detection unit," with only isolated voids permitted due to casting anomalies and which represent less than 0.01 percent of the total glassed surface. Test procedure and acceptance criteria shall be per the attachment "MP-9.2, Porcelain Enamel Continuity Testing," and documentation shall be furnished with each shipment of material listing the test results by identifying "mark or "tag" numbers.
- g. The finished glass lined pipe shall not deviate more than 0.0125 inch per foot of length from a centerline perpendicular to the square pipe end or flange face.
- h. Handle pipe according to lining manufacturer's recommendations.
- i. Taps and welds shall be done before lining. Field cut and repair field cuts in accordance with manufacturer's recommendations.

STEEL PIPE

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL	
Steel Water Pipe 6" to 36"		ST-P-1	
PIPING MATERIAL		JOINTS	
Class		Joint Type	Butt-welded or flanged, as required
Schedule/DR/SDR	Schedule 40 (See Note 3)	Field Welding Std.	AWWA C206
Grade	Grade B	Shop Welding and Fabrication Std.	AWWA C207
Type of Service	Water		
Material Std.	ANSI/AWWA C200, ASTM A53, Type S	GASKETS	
		Gasket Std.	Per GSKT data table
		FITTINGS	
		Fitting Material	Steel, FL, Grooved or Plain End Butt Welded.
NOTES			
1. Flanged fitting shall be hub style, slip-on in accordance with AWWA C207, Class D. Flat faced or raised face to be compatible with connecting piping, ANSI B16.1 Standard.			
2. Pipe interior lining shall be NSF approved fusion bonded epoxy. Scotchcoat 134 or 206N, unless noted otherwise.			
3. <u>Steel Seamless Casing Pipe</u> : Where used for steel casing; pipe shall meet ASTM A139 Grade B with Electric Fused welding per ASTM A335 with minimum yield of 35ksi and 5/8-inch wall thickness. Exterior to be coated with bituminous asphalt.			

STAINLESS STEEL PIPE

SIZE AND TYPE OF PIPING MATERIAL		SYMBOL
Stainless Steel Pipe		<i>SST-P-1</i>
Pipe Size	1/2-Inch through 30-inch.	
Piping Material Requirements	1. Manufactured to nominal pipe sizes as listed in ANSI B36.19 2. Seamless pipe per ASTM A312 3. 304L or 316L as noted. 304L shall be used unless otherwise specified hereinafter or shown on the drawings. 4. Pipe shall have a wall thickness meeting the minimum requirements of Schedule 10S, or as shown on the drawings.	
REQUIREMENTS FOR ALL PIPE SIZES:		
1. Pipe designated for vacuum service on the drawings shall be designed for and subject to full vacuum. Calculations showing that the selected wall thickness is acceptable for the service conditions shall be prepared and submitted. Minimum schedule 10S required.		
2. Fitting, Joints, Fabrication, Finishing and Handling Requirements: A. FITTINGS (tees, reducing tees, or branch connections): 1. Butt Welding Type where noted or shown Rated 150 PSI minimum. a. Stainless steel, ASTM A 403, Grade WP304L or WP316L, Class W with schedule and material to match connected piping unless noted otherwise. Tees shall have no welds in the throat area and the crotch shall be reinforced with long radius design to eliminate sharp corners. b. Dimensions in accordance with MSS SP-43 and ANSI B16.9. Branch connections may include wrought tees or reducing tees, forged commercial welding branch fittings, extruded reducing branches, or weld-o-lets. 1) Forged commercial welding branch fittings with butt welded outlet shall be stainless steel, in conformance with ASTM A182, Grade F316L, with schedule and material to match connected piping. No repair welding shall be performed on forged fittings without prior approval of the Engineer. 2) Branches may be formed by an extrusion method (pulled) from pipe, where the extruded branch connections are less than 75 percent of the nominal diameter of the pipe. For extruded branch connections greater than 75 percent of the nominal diameter of the pipe, provide external reinforcing saddle strap if pipe working pressure is greater than 50 psi. 3) Weld-o-lets may be used for connections up to 1/2-inch maximum. Construction shall match the connected pipe size, schedule, and FNPT outlet. 2. Grooved End: Where noted or shown. a. Machine grooves into pipe end (Schedule 40, minimum) in accordance with grooved fitting manufacturer’s recommended dimensions, tolerances, and finishes. b. Roll cutting of grooves into piping will be permitted on Minimum Schedule 40 pipe. The interior pipe wall shall be smooth and free of crevices, gouges, or other anomalies. Per AWWA C606. c. When used with Schedule 10S pipe, the groove shall be cut or rolled into a Schedule 40 spool piece to be welded to the pipe. The Schedule 40 spool piece shall be taper bored at a 3:1 slope to provide a smooth transition of inside diameters. D. JOINTS: 1. Shop Fabricated Assemblies: a. Shop fabricated assemblies shall be butt welded.		

- b. All welding shall be performed in the shop in accordance with the latest editions of Section IX of the ASME Boiler and Pressure Vessel Code and ASME Code for Pressure Piping, ASME B31.3 (normal service), as applicable.
 - c. All welds shall have 100 percent penetration. The internal weld bead shall be small, smooth and continuous with no crevices, pits or other voids. The external weld bead shall be well rounded, smooth and continuous with no anomalies.
 - d. All welded connections shall be parallel and perpendicular to the extent that the piping appears to be correct to the naked eye.
 - e. Procedure:
 - 1) *Pipe edges shall be prepared by machine cutting or shaping using an aluminum oxide blade. Beveled ends shall conform to the requirements of ANSI B16.9.*
 - 2) *Clean weld joints and weld joint areas both before and after welding in accordance with ASTM A380 using stainless steel wire brushes or stainless steel wool.*
 - 3) *Alignment:*
 - a) Align ends to be joined within commercial tolerances on diameter, wall thickness, and out-of-roundness.
 - b) When joining pipes of different wall schedule, taper bore the interior of the larger schedule pipe to match the interior diameter of the connecting pipe with a maximum 1:3 slope.
 - c) Root opening at the joint shall be as stated in the procedure specification.
 - 4) *Welding:*
 - a) The direct current, straight polarity, gas tungsten-arc (GTAW) process shall be used for all welding. Welding may be by manual GTAW or automatic (orbital) GTAW processes.
 - b) The inside of the pipe shall be purged with Argon gas during welding and while the weld is cooling to prevent oxidation of the weld.
 - c) Tack Welds:
 - All tack welds shall be made by a qualified welder.
 - All tack welds shall be made with welding rod the same as that used for the succeeding root pass.
 - Tack welds shall be small enough to be readily fused into the bead of the root pass.
 - Thoroughly clean tack welds with a stainless steel wire brush prior to the root pass to prevent pinholing or excessive porosity.
 - Tack welds, which have cracked, shall be completely removed prior to making the root pass.
 - d) Surface defects, which will affect the soundness of the weld, shall be removed, visually inspected, and re-welded.
 - e) Where permitted, branch connections shall be fitted and groove-welded in accordance with the details described and shown in Chapter V of ASME B31.3.
2. For connections requiring field assembly:
- a. Welded: Field welding of stainless steel piping connections will not be allowed.
 - b. Van Stone: Class 150 or Class 300 Van Stone type flanges with stainless steel stub ends, ASTM A240 Type 316L "as-welded grade", conforming to MSS SP 43, wall thickness same as pipe.
 - c. Threaded: For connections to weld-o-let outlet for instrument or sample taps only.

- d. Union Fittings: Where noted or shown.
- e. Flanged: For connections to flanged devices, or where otherwise noted or shown.
 - 1) *Type: Forged stainless steel, ASTM A182, Grade F316, lap joint flange with stainless steel stub end, ASTM A240, Type 316L, welded grade conforming to MSS-SP43; schedule to match pipe.*
 - 2) *Dimensions: To match connected piping, faced and drilled ANSI Class 150, 1/16-inch raised face, unless otherwise shown or required for connection to equipment.*
- f. Groove Fittings: Where noted or shown.
 - 1) LIQUID SERVICE:
 - a.) Style: Segmented and bolted. Victaulic, Style 77; or equal:
 - b.) Materials for Housings for groove couplings shall be 316SS
 - 1. conforming to ASTM A 351, A 743 and A 744 Grade CF-8M with
 - ii. AIR SERVICE:
 - a.) Victaulic Style 232S Restrained flexible coupling with silicone gaskets suitable for use with air and rated to 300°F.
 - 2.

C. CLEANING, DESCALING, PICKLING AND PASSIVATING

- 1. All stainless steel piping, fabrications, fittings and assemblies shall be shop fabricated and shall be cleaned, descaled, pickled and passivated per ASTM A380-06, ASTM A967-05 and Ferroxyl Inspected per ASTM A967-05.
 - a. Pickling: Process shall be by immersion method. Spray methods shall not be allowed. Fabrication size shall be constructed and coordinated with the Pickle/Passivation process such that the fabrications can be completely immersed. Contact time shall be minimum of four hours.
 - b. Passivation: Rinsing must be done directly following pickling so solution does not dry. Rinsing shall use water with chloride content less than 25 mg/L. Contact with air to create passive film on the surface. Repeat pickling/passivation process if foreign material or scale has not been removed.
 - c. Inspection: Provide written certification that all parts have been cleaned, pickled and passivated per referenced standards. Provide Ferroxyl testing per referenced standards.
 - d. Shipping and Handling: Cap/seal all openings prior to shipment. Place items on clean wood surfaces and handle with non-ferrous metals for lifting and restraining during shipment. Materials shall be shipped in an enclosed trailer, and shall be stored indoors at all times.

APPENDIX B

Fittings and Connections Data Tables

DUCTILE IRON FITTINGS
3-Through 48-Inch Flanged Fittings

FITTING MATERIAL and TYPE		TABLE REFERENCE #	
Ductile Iron Flanged Fittings		<i>DI-F-FL</i>	
Type of Service	Potable water, wastewater, reclaimed water		
Fitting Material Std.	ANSI/AWWA C110/A21.10 (current revisions)		
Pressure Rating	• 250 psi (min) • 350 psi for smaller sizes		
NOTES			
1. Flange surface shall be faced and drilled in accordance with ANSI Class 125 B16.1. 2. Gray iron flanges shall not be permitted. 3. Coated and lined same as pipe.			

DUCTILE IRON FITTINGS
3-Through 48-Inch Mechanical Fittings

FITTING MATERIAL and TYPE		TABLE REFERENCE #	
Ductile Iron Mechanical Fittings		<i>DI-F-M</i>	
Type of Service	Potable water, wastewater, reclaimed water		
Fitting Material Std.	ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11 OR ANSI/AWWA C153/A21.53 and ANSI/AWWA C111/A21.11 (current revisions)		
Pressure Rating	3- through 24-Inch shall be rated for 350 psi working pressure 30- through 48-Inch shall be rated for 250 psi working pressure		
NOTES			
1. All exterior buried fittings greater than 3 inches shall be ductile iron mechanical joint with mechanical joint restraints, unless otherwise noted on the Contract Drawings and pipe schedule. 2. Coated and lined same as pipe.			

DUCTILE IRON FITTINGS
3-Through 48-Inch Grooved Fittings

FITTING MATERIAL and TYPE		TABLE REFERENCE #
Ductile Iron Grooved Fittings		<i>DI-F-G</i>
Type of Service	Potable water, wastewater, reclaimed water	
Fitting Material Std.	ASTM A536 Ductile Iron Castings	
Grooved Joint Std.	ANSI/AWWA C606 (current revisions), grooved end cast or ductile iron	
Center-to-end Dimensions Std.	ANSI/AWWA C110	
Wall Thickness Std.	ANSI/AWWA C153	
Rigid Radius Std.	ANSI/AWWA C606	
NOTES		
1. AWWA Grooved Piping System – Mechanical grooved pipe couplings and fittings, as manufactured by Victaulic Company of America or approved equivalent. Grooved pipe couplings and fittings shall conform to the following requirements. Grooved end product manufacturer to be ISO-9001 certified. 2. Grooved coupling shall be a Victaulic Style 31 grooved coupling for ductile iron piping, or approved equivalent, with ductile iron body with Tnemec coating suitable for submergence in wastewater, and 316 stainless steel bolts and nuts. 3. Grooved flange adapter: Coupling shall be a Victaulic Style 341 grooved flange adapter or approved equivalent. The coupling shall have a ductile iron body with nitrile gaskets or orange enamel coating and 316 SS bolts and nuts. 4. Coated and lined same as pipe.		

GASKETS

TABLE REFERENCE #	GSKT
Joint Type →	Push-On, Mechanical, and Proprietary Restrained Joints
Gasket Material	Vulcanized styrene butadiene rubber (SBR), unless otherwise noted.
Gasket Std.	ANSI/AWWA C111/A21.11, unless otherwise noted.
Joint Type →	Flanged, Water and Sewage Service for DI and STL fittings
Gasket Material	Full faced, ⅜-inch thick, red rubber (SBR), hardness 80 (Shore A), rated to 200° F
Gasket Std.	ANSI B16.21, AWWA C207, and ASTM D1330, Grades 1 and 2
Joint Type →	Flanged, Hot Air (DI, ST and SST)
Gasket Material	Full faced, ⅜-inch thick, homogeneous black rubber (EPDM), hardness 60 (Shore A), rated to 300° F
Gasket Std.	ANSI B16.21 and ASTM D1330 Steam Grade
Joint Type →	Grooved End Joints for DI and STL fittings
Gasket Material	Halogenated butyl
Gasket Std.	ASTM D2000 and AWWA C606
Joint Type →	Stainless Steel Flanged and Grooved Piping Systems
Gasket Material	Flanged Joints, Test Pressure > 200 psig: Manufactured with spiral wound 316L stainless steel with chlorocarb (non-asbestos) filler and 316 stainless steel inner ring and outer centering ring. The spiral wound component shall be wound from metal preformed in a chevron configuration. Gaskets shall be Spiraseal Style WR as manufactured by Lamons or equal. 1. <i>Flanged Joints, Test Pressure < 200 psig: Full faced, ⅜-inch thick, homogeneous black rubber (EPDM), hardness 60 (Shore A), rated to 300° F.</i> 2. <i>Grooved Joints: Food Grade EPDM, unless noted otherwise.</i>
NOTES	
1. Gasket pressure rating to equal or exceed the system hydrostatic test pressure. 2. Blind flanges shall be gasketed covering the entire inside face with the gasket cemented to the blind flange. 3. Gaskets shall be compatible with temperature, pressure, and service of the pipe.	

PIPE COUPLINGS

Connection Type		TABLE REFERENCE #	
Couplings (Straight and Reducing and Adapting)		CPLG	
Coupling Type	Straight and Transition		
Use With	Steel, PVC, and Ductile Iron		
Approved Coupling	Romac Industries Style 501 with fusion bonded epoxy coating, or approved equivalent		
Notes	Pipe straight coupling joints shall be mechanically restrained unless the requirements for soil/backfill friction length are provided on both sides of the joint. If friction length cannot be achieved, provide external restraint harness, Romac Series 600 (12-inch and smaller), or additional thrust blocks to provide longitudinal restraint with vertical joint flexibility.		
Coupling Type	Reducing Coupling		
Use With	Steel to ductile iron connections		
Approved Coupling	Romac Industries Style RC400 with fusion bonded epoxy coating, or approved equivalent.		
Coupling Type	Flange Coupling Adapter (FCA)		
Use	Fully restrained FCA consisting of hardened steel wedges bearing on the outside pipe wall.		
Approved Coupling	EBAA Iron Sales Company, Mega-Flange, or equal		
Rated Operating Pressure	225 psi	Rated Operating Temperature	250 degrees F
Body Material	Cast or ductile iron		
Flanged End Material	Flat faced, 125-pound per ASME B16.1.		
Lining and Coating	Manufacturer’s standard high build epoxy		
Gaskets	EPDM		
Notes	• Set screw type grips are not acceptable. • Size as required to mate with adjoining pipe. • Install only where shown on the Drawings. • Substitution of FCAs is not acceptable in lieu of fittings as specified in Section 15060 – Piping and Fittings, unless approved by submittal by the Owner or Owner’s representative prior to installation.		
Coupling Type	Field Flange		
Use	Ductile Iron and Steel Pipe		
Approved Coupling	EBAA Iron, Inc. Series 1000 ductile iron flange adapter with fusion bonded epoxy coating, or approved equivalent		
Notes			
Coupling Type	Flanged Dismantling Joint		

Approved Coupling	Romac Industries DJ400 with fusion bonded epoxy coating
Notes	• Not for use with aeration piping (ALP or AHP).
Approved Coupling	Romac Industries DJ400 with fusion bonded epoxy coating
Notes	• Provide EPDM peroxide cured gasket when used with aeration piping (ALP or AHP). • Gasket shall be suitable for use with temperatures up to 250°F
Coupling Type	Stainless Steel Pipe Couplings
Use	Unrestrained (for pipes with external restraint and anchoring)
Approved Coupling	Straub Flex Coupling
Notes	• 316 SS construction with EPDM elastomers meeting AWWA and NSF requirements. • Pressure rating shall be 1.5 times working pressure
Use	Restrained (for pipes without external restraint or anchoring)
Approved Coupling	Straub Metal Grip Coupling
Notes	• 316 SS construction with EPDM elastomers meeting AWWA and NSF requirements. • Pressure rating shall be 1.5 times working pressure
NOTES	

FLEXIBLE PIPE (EXPANSION) COUPLINGS		TABLE REFERENCE #
Connection Type		CPLG-FLX-1
Flexible Pipe Expansion Couplings		
Working Pressure Rating (ALL)	250 psi	
Flexible Expansion Coupling Type	Type 1	
Approved Coupling	Proco Style 240 single arch, EPDM construction	
Use	Wastewater service	
Notes	• Provide external restraint rods/flanges to limit fitting expansion. • Rods and hardware shall be galvanized for DI pipe system; SST for SST pipe systems. • Couplings shall be installed within manufacturer's recommended piping misalignment limits.	
Flexible Expansion Coupling Type	Type 2	
Approved Coupling	Proco Style 440-BE molded PTFE expansion joints	
Use	Chemical service PVC pipe system applications	
Notes	• Provide external restraint rods/flanges to limit fitting expansion. • Rods and hardware shall be SST.	
Flexible Expansion Coupling Type	Type 3	
Approved Coupling	Red Valve Red Flex, EPDM construction	
Use	NSF-61 approved for Potable Water Service	
Notes	• Provide external restraint rods/flanges to limit fitting expansion.	

	- Rods and hardware shall be galvanized for DI pipe system; SST for SST pipe systems. - Couplings shall be installed within manufacturers recommended piping misalignment limits.
Flexible Expansion Coupling Type	Type 4
Approved Coupling	Flexicraft Industries, Bellows Connector, or approved equivalent
Use	For use with digester gas piping
Notes	- Metal expansion joints shall consist of a single metal bellows, three (3) tie rods and Vanstone flange end fittings. Flanges shall be 304 stainless steel and an ANSI 150-lb type. The bellows shall be of a 304 stainless steel. - Joints shall be designed to meet the design pressure of 14 inches water column and temperatures between -20°F and 135°F, and shall be capable of accommodating piping system and equipment movements as needed. - Joints are to be provided with stainless steel drop-in liners and carbon steel covers. Tie rods shall be included to prevent overextension of the expansion joints from pressure thrust loads. The number and size of the control rods shall be sufficient for the maximum system test pressure.
NOTES	
- Unless specifically noted otherwise, provide zinc plated restraint rods (extension ears and nuts) for all expansion joints to restrain axial expansion and compression of the expansion joint. - Provide 304 or 316SS hardware when mating to SS piping systems.	

FLEXIBLE PIPE (EXPANSION) COUPLINGS

Flexible Expansion Coupling Type	Type 5
Approved Coupling	Proco Style 240 lined rubber expansion joint
Use	Per plans
Notes	• Provide stainless steel external control rods and plates. • Couplings shall be installed per manufacturer's recommendations in order to minimize misalignment. • Coupling shall have a minimum axial compression of 2.0 inches, a minimum axial extension of 1.0 inches, and a minimum lateral deflection of 1.0 inch.
Flexible Expansion Coupling Type	Type 6 Straight (non-reducing) Expansion Joints
Approved Coupling	Proco Style 240 Single Sphere Molded Expansion Joints
Use	
Notes	• With floating metallic flanges freely rotate on the bellows, compensating for mating flange misalignment. • Gaskets are not required with the Style 240, provided the expansion joints are mated against a flat face flange as required in the installation instructions. • Flanges shall have plated carbon steel flanges for corrosion protection. • Provide 304 or 316 stainless steel flanges when mating to SS piping systems. • Position elastomer bellows between full face piping flanges. • Do not position against check or isolation valves.
Flexible Expansion Coupling Type	Type 7 Reducing Expansion Joints
Approved Coupling	Proco Style 240 RE/CE concentric and eccentric rubber expansion joint; single open wide arch type
Use	Per plans
Notes	• Eccentric in design, the expansion joint body tapers on one side transitioning two different flange sizes. • Concentric in design, the expansion joint maintains pipeline centerline across two different flange sizes. • Position elastomer bellows between full face piping flanges. • Do not position against check or isolation valves.
Flexible Expansion Coupling Type	Type 8 Straight (non-reducing) Expansion Joints
Approved Coupling	Proco Series 440 Molded Expansion Joints
Use	Chemical Service, per plans
Notes	• Provide inner and outer tube materials compatible with process fluid and associated environment. • Submit information for materials selection for review by Engineer.
Flexible Expansion Coupling Type	Type 9
Approved Coupling	Elastomer bellows flexible connection
Use	
Notes	• Rated Operating Pressure: 225 psi. • Rated Operating Temperature: 250 degrees F. • Nominal Pipe Sizes: Size as required to mate with adjoining pipe.

	• Quantities and Spacing: As a minimum, install at each pump suction and discharge connection to rigid piping, and where shown otherwise on the Drawings. • Materials: Body: EPDM-lined chlorobutyl elastomer. • Flanged Ends: Drilled for cast iron 125-pound per ASME B16.1, or carbon steel 150-pound per ASME B16.5. • Retaining Rings, Washers, Bolting Hardware: Type 316 stainless steel. • Manufacturer and Model: Unisource Manufacturing, Series 1501, or equal.
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QUICK CONNECT COUPLINGS

Connection Type		TABLE REFERENCE #
Quick Connect Couplings		CPLG-QC
Working Pressure Rating (ALL)		
Coupling Type	Type 1, Twin cam arm actuated, male and female, locking	
Approved Coupling	OPW Kamlok, Ryan Herco	
Use	Chemical Systems	
Notes	- Materials: Glass-filled polypropylene or PVDF with EPDM, Viton-A or Teflon gaskets as recommended for the chemical service by the manufacturer. - End Connections: NPT threaded or flanged to match piping connections. Hose shank for chemical installations. - Plugs and Caps: Female dust cap for each male end; male dust plug for each female end. - Pressure Rating: 125 psi minimum at 70° F	
Coupling Type	Type 2, Twin cam arm actuated, male and female, locking	
Approved Coupling	OPW Kamlok, Dover Corporation, or approved equal	
Use	Sewage service.	
Notes	- Materials: Stainless steel with Buna N gaskets as recommended for the service by the manufacturer. - End Connections: NPT threaded or flanged to match piping connections. Hose shank quick connect coupler. - Plugs and Caps: Female dust cap for each male end; male dust plug for each female end. - Pressure Rating: 75 psi minimum at 70° F	
NOTES		

END OF SECTION

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SECTION 15100 VALVES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnishing and installing valves as shown and specified. In addition, valve-operating units, stem extensions and other accessories shall be furnished and installed by the Contractor where shown, or where required in the opinion of the Engineer, to provide for convenience in operation. Where buried valves are indicated, the Contractor shall furnish and install valve boxes to grade per the Standard Details – see drawings. All valves shall be new and of current manufacture.
- B. Not all valves and operators listed in this section are used in this project Sample Faucet Valves.

1.2 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop drawings of all valves and operators, including wiring diagrams and electrical data, shall be furnished as specified in Section 01300.
- C. Submit manufacturer's installation instructions and maintain copy at job site.
- D. Project Record Drawings: Record actual locations of valves, operators, and accessories.
- E. Service: Valve shall be suitable for the specific service conditions, (e.g., raw sewage, sludge, specific chemical, potable water, and etc.). Submit product information verifying valve is compatible with intended service conditions.

1.3 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01730.
- B. Maintenance Data: Include installation and maintenance instructions, recommended spare parts lists, and exploded view of valves, gates, operators, and accessories.

1.4 QUALITY ASSURANCE

- A. Manufacturer's name and pressure rating marked on valve body.
- B. Perform work in accordance with manufacturer's recommendation.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products at job site under provisions of Section 01600.
- B. Accept valves, operators, and accessories in shipping containers with labeling in place in accordance with AWWA C-501. Inspect for damages.
- C. Seal valve ends and gate ends to prevent entry of foreign materials.

1.6 TAGS AND IDENTIFICATION

- A. Permanent tags shall be provided for every valve, instrument, and gate. See Section 11000.

1.7 DEFINITIONS

Abbreviations used in Detailed Valve Specification Sheets:

ARV-Air Release Valve
BV- Ball Valve
BFV - Butterfly Valve
CV- Check Valve
CS- Corporation Stops
GV- Gate Valve
PRV-Pressure Regulating Valve

1.8 PROCESS FLUIDS COMMODITY LIST

- A. Reference 15060 and Piping Schedule

PART 2 - PRODUCTS

2.1 GENERAL

- A. Unless otherwise specified, each valve body shall be tested under a test pressure equal to twice its design water-working pressure.
- B. Unless otherwise specified, all interior bronze parts of valves except gate valve stems shall conform to the requirements of the "Specification for Composition Bronze or Ounce Metal Castings," (ASTM B62). Gate valve stems shall be of bronze containing not more than 5% of zinc nor more than 2% of aluminum and shall have a minimum tensile strength of 60,000 psi, a yield strength of 40,000 psi, and an elongation of at least 10% in 2 inches, as determined by a test coupon poured from the same ladle from which the valve stems to be furnished are poured.
- C. The flanges of valves may be raised or plain faced. Flanges of valves for water-working pressures of 175 psi or less shall be faced and drilled to 125-lb American Standard

template. Flanges of valves for water-working pressures greater than 175 psi shall be faced and drilled to 250-lb American Standard template.

- D. The exterior surfaces of all interior and submerged valves shall be epoxy coated with 3 to 5 MDFT of epoxy-polyamide primer in preparation for coating, as specified in Section 09900.
- E. Valve Operators:
 - 1. Unless otherwise shown or specified, manual handwheel operators, with position indicators, shall be provided for valves 6 inches and larger. Lever operators may be supplied on quarter-turn-type valves smaller than 6 inches; however, operator force shall not exceed 40 pounds under any operating condition, including initial breakaway.
 - 2. Operators of the worm-and-gear-type shall have self-locking worm gears. The operators on quarter-turn-type valves shall be of the self-locking-type to prevent the plug or disc from creeping and shall be provided with position indicators to show the position of the plug or disc. Lever-type operators on exposed valves shall have some means of being fixed in any position to prevent movement.
 - 3. Buried operators on valves larger than 2 inches shall have a 2-inch AWWA operating nut. Buried operators on valves 2-inch and smaller shall have a T-handle for operation by forked key, unless otherwise shown or specified.
 - 4. All buried valves shall be installed with valve boxes. When the valve centerline is more than 4 feet below the finished grade, extension stems are required.
- F. All moving parts of buried valves and operators shall be enclosed in the housing to prevent contact with the soil.
- G. Unless otherwise shown or specified, all exposed nuts, bolts, washers, and springs shall be stainless steel.
- H. Where designated, certain valves shall be furnished with electric operators provided by the valve manufacturer. All operators of a given type shall be furnished by the same manufacturer. Where these operators are supplied by different valve manufacturers, the Contractor shall coordinate their operator selections to provide uniformity of each type of electric operator.
- I. Unless specifically required to be equipped with other types of operators, all valves with centerline more than 6 feet above the operating floor shall be equipped with chain wheels and operating chains. Each chain-wheel-operated valve shall be equipped with a chain guide that will permit rapid handling of the operating chain without "gagging" of the wheel. Lever operated valves shall be provided with operating chains.
- J. Valves and operators in particular locations may require a combination of units, sensors, limit switches, and controls specified in other divisions of these Specifications. It shall be the responsibility of the Contractor to properly assemble and

SECTION 15100

VALVES

install these various items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.

- K. Strainer shall be provided ahead of any electric solenoid control valves and regulators.
- L. Valve Boxes: Valve boxes, except those noted as special design required on the Drawings, shall be of cast iron of the two-piece extension-type with cast iron cover. The extension shall provide for the maximum depth of cover over the pipe in which the valves are to be used. Valve boxes shall have walls not less than 3/16-inch thick at any point, and the internal diameter shall be not less than 5 inches. Valve box covers shall have the word "SEWER" or "WATER" cast into them as appropriate to their place of use. All valves underground shall be installed with valve boxes.
- M. Miscellaneous Valves: Where indicated on the Drawings, but not specifically identified, Contractor shall furnish and install miscellaneous valves per this specification. Valves shall be high quality and suitable for the indicated service and approved by the Engineer.

2.2 VALVE DATA PRODUCT INFORMATION SHEETS

- A. Individual data sheets for each valve type are included following this section.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All valves shall be installed in accordance with good trade practices and the manufacturer's instructions and recommendations.
- B. Unless otherwise indicated on the Drawings, all valves installed in horizontal pipe runs having a centerline elevation 4'-6" or less above the finished floor shall be installed with their operating stem vertical. If adjacent piping prohibits this, the valves shall have their operating stems orientated to facilitate the most practical operation. Valves installed in horizontal pipe runs having a centerline elevation greater than 4'-6" above the finished floor shall be installed with their operating stems horizontal. If adjacent piping prohibits this, the stems shall be installed above the valve horizontal centerline as close to horizontal as possible. Valves installed in vertical runs of pipe shall have their operating stems orientated to facilitate the most practicable operation.
- C. Provide all necessary fittings to install valve at the location shown in the Plans.
- D. All plug valves installed in sludge lines shall be installed with the seat on the upstream side.

3.2 PAINTING

- A. All valves unless otherwise specified, shall be painted in accordance with Section 09900.
 - 1. The exterior surfaces of all interior and submerged valves shall be epoxy coated with 3 to 5 MDFT of epoxy-polyamide primer in preparation for coating, as specified in Section 09900.
- B. All buried valves shall be coated with the manufacturer's fusion bonded epoxy, suitable for buried service.

3.3 TESTING

- A. All equipment shall be tested in accordance with Section 11000, Part 1.4 and Section 15060 as part of a completed system.
- B. Valves shall be tested at the same time that the adjacent pipeline is tested. Joints shall show no visible leakage under test.

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Air Release Valve

TYPE OF VALVE		SYMBOL	
Combination Air Vacuum / Release Valve		ARV-2	
VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIALS (Note 1)	Type of Service	Water (Note 2)
Shell	Ductile Iron	Reference Document	AWWA C512
Body/Base	Ductile Iron	Size Range	1/2" to 2"
Discharge		Body/Valve Ends	NPT
Seat	Buna-N	Pressure Rating (psi)	3 to 250
Float	Stainless Steel	Temperature Rating (deg C)	
Bolts/Screws	Stainless Steel	Testing	
Strainer	None	Operator	NA
Coating & Lining	Fusion Bonded Epoxy	Actuator	NA
NOTES			
1. For Potable Water Applications, Valve shall be NSF 61 certified– Lead free.			
2. Suitable for venting air and protection from vacuum under normal service conditions.			
3. Provide all necessary fittings and isolation to install the valve at the location shown in the plans.			
4. Install the combination air release/vacuum valve on the discharge piping as shown in the plans to rid the piping of entrapped air during normal operating conditions and allow air to exit/enter the piping during filling/emptying conditions.			
ACCEPTABLE PRODUCTS			
DeZURIK APCO AVV-140		Val-Matic 201C.2	

Ball Valve

TYPE OF VALVE		SYMBOL	
Ball Valve		BV-2	
VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIALS (Note 1)	Type of Service	Air, Water, Process Water
Body	SS	Reference Document	
Ball	SS	Size Range	<3"
Seats	Teflon	Body/Valve Ends	NPT, FNPT, Solder as required on drawings with Single Union
Shaft	SS	Pressure Rating (psi)	600 pound WOG
Elastomers		Temperature Rating (deg C)	
		Testing	
		Operator	Lever Handle
		Actuator	
NOTES			
1. SS Valves shall be used in SS pipe lines. Valves shall be NSF 61 Certified for Potable Water applications -Lead free. 2. Ball valve must have a union fitting, lockable handle, and imprinted tagging.			
ACCEPTABLE PRODUCTS			
Watts	Mueller	Apollo 76F-100 / 200	
	Swagelok Series 40 (up to ¾")		

Butterfly Valve

TYPE OF VALVE		SYMBOL	
Butterfly Valve		BFV-1	
VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIALS (Note 1)	Type of Service	Water, Compressed Air; Interior Exposed Mechanical
Body	One piece cast iron or ductile iron body.	Reference Document	AWWA C504
Disc	The disc shall be secured to the shaft using at least two Type 316 stainless steel pins or self-locking setscrews. 316 stainless steel disc.	Size Range	3" to 30"
Bushings/ Bearings	All valves shall be furnished with two upper bearings/bushings and one lower bearing/bushing of PTFE material or Nylatron .	Body/Valve Ends	125/150# pattern Lugged Style (Note 2) AWWA Valves to be Flanged
Pins	Stainless Steel.	Pressure Rating (psi)	150 PSI Liquid, Air or Vacuum Service for AWWA Valves, Bi-Directional "dead end" or 175 psi with directional (with disc)/100 psi (against disc) "dead end" bubble tight shutoff capability without the use of backing flanges.
Shaft/ Stem	316 or 416 Stainless Steel. Shaft seals shall be provided to prevent leakage and to protect bearings from internal or external corrosion.	Temperature Rating (deg C)	
Seats/ Seals	Valve seats shall be of the reinforced resilient type and shall be field replaceable (in sizes over 24" on AWWA valves). Seats on Lugged Valves shall also act as a body liner to prevent flow from contacting the body casting. Seats on Industrial Valves shall have flange sealing to provide a positive seal without use of flange gaskets. Water Service: EPDM; Compressed Air Service (high pressure): PTFE; Process Air Service (low pressure): Fluorocarbon (Viton, RTFE, or Fluorinated Hydrocarbon Elastomer ASTM D1418) rated for 350° minimum or higher if required by process.	Testing	Factory Testing shall be conducted on each valve in accordance with Manufacturer's Quality Control procedures.
Packing		Operator	4" Lever Handle,

			>4" Geared Handwheel /Chainwheel
Backing Ring		Actuator	Electric actuators or Pneumatic or Manual as shown on the plans and as specified in Section 15106 and Division 16. (Note 2). Include Manual Override.
NOTES			
1. For Potable Water Applications, Valve shall be NSF 61 certified – Lead free and AWWA Compliant 2. Valve shall be capable of being installed vertically or horizontally; and have the ability to be installed with the disc in the closed position.			
ACCEPTABLE PRODUCTS			
Bray Series 30/31	Keystone	Pratt Series BF, 2FII or Triton	

SECTION 15100

VALVES

Butterfly Valve

TYPE OF VALVE		SYMBOL	
Butterfly Valve		BFV-4	
VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIALS (Note 1)	Type of Service	Water. Buried.
Body	Cast iron (ASTM A-126)	Reference Document	AWWA C504
Disc	Ductile iron	Size Range	4" to 36"
Bushings/ Bearings		Body/Valve Ends	125/150# pattern FL or MJ as shown on the drawings (Note 2)
Pins		Pressure Rating (psi)	150 PSI Liquid, Air or Vacuum Service Bi-Directional
Shaft/ Stem	316 stainless steel shaft with o-ring seals	Temperature Rating (deg C)	
Seats/ Seals	BUNA-N seal	Testing	Factory Testing shall be conducted on each valve in accordance with Manufacturer's Quality Control procedures.
Packing		Operator	2" Nut, fully gasketed. Minimum 24 turns from open to closed
Backing Ring		Actuator	NA
NOTES			
1. For Potable Water Applications, Valve shall be NSF 61 certified – Lead free.			
2. Valve shall be capable of being installed vertically or horizontally.			
ACCEPTABLE PRODUCTS			
Pratt – Groundhog	Mueller	Clow BFV 4500 (3" to 24") Clow BFV 1450 (30" to 36")	
Val-Matic American BFV			

Check Valve

TYPE OF VALVE		SYMBOL	
Globe Style Check Valve		CV-7	
VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIALS (Note 1,3)	Type of Service	Potable Water
Body	Ductile iron body ASTM A-536 65-45-12	Reference Document	-
Type of Disc	Dual guided (top and bottom)	Size Range	4" to 24"
Disc	Stainless steel ASTM type 304	Body/Valve Ends	FL per drawings (Note 2), 125# ANSI flat face flanges
Guide bushing	304 Stainless Steel	Pressure Rating (psi)	150 PSI
Guide pins	Type 304 Stainless Steel	Temperature Rating (deg C)	-
Helical or conical spring	ASTM A313 Type 304 Stainless Steel	Testing	-
Packing		Operator	-
Shaft		Actuator	-
Seats	Stainless steel ASTM type 304		
Bonnet			
Elastomers			
Cover			
NOTES			
1. For Potable Water Applications, Valve shall be NSF 61 certified– Lead free.			
2. Valve shall be capable of being installed vertically or horizontally.			
3. Check valve to have a minimum open area in the body of 110% of the area of the entering or corresponding pipe.			
4. Verify the adjacent upstream flange for the adjacent pipe/fitting/valve, internal diameter will adequately support/restrain the check valve internal mechanism within the check valve body. Provide filler flange as necessary.			
ACCEPTABLE PRODUCTS			
Pratt	Milliken	Mueller	Kennedy
Val-Matic Series 1800A			

CORPORATION STOPS

TYPE OF VALVE		SYMBOL	
Corporation Stops		CS-1	
VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIALS (Note 1)	Type of Service	Water, Buried.
Body	Bronze	Reference Document	AWWA C800
Gasket	EPDM	Size Range	¾" to 2"
		Body/Valve Ends	NPT
		Pressure Rating (psi)	300 PSI Liquid, Air or Vacuum Service
		Temperature Rating (deg C)	-
		Testing	Factory Testing shall be conducted on each valve in accordance with Manufacturer's Quality Control procedures.
		Operator	T-head fork handle
		Actuator	-
NOTES			
1. For Potable Water Applications, Valve shall be NSF 61 certified – Lead free.			
ACCEPTABLE PRODUCTS			
Ford Meter Box Company		Mueller	

Gate Valve - Resilient Seat

TYPE OF VALVE		SYMBOL	
Resilient Seat Gate Valve		GV-2	
VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIALS (Note 1, 3)	Type of Service	Liquid
Body	Ductile Iron (Note 2)	Reference Document	AWWA C509 and 515
Type of Disc	Full Round Port	Size Range	2 to 12 inches
Wedge	Ductile Iron or Cast Iron (Note 2)	Body/Valve Ends	FL or MJ per drawings
Trim	Mfr Standard	Pressure Rating (psi)	200 operating, 400 design, min. The valve shall seal at full rated pressure with flow from either direction.
Packing	Double O-Ring seal	Temperature Rating (deg C)	
Shaft	Mfr Standard	Testing	
Seats	Steel Reinforced Rubber, replaceable, or fully encapsulated Rubber	Operator	NRS; Handwheel (exposed) or 2-inch square nut (buried).
Bonnet	Mfr Standard	Actuator	
NOTES			
1. For Potable Water Applications, Valve shall be NSF 61 certified– Lead free.			
2. Epoxy coat interior surfaces.			
3. All exposed nuts, bolts and washers shall be zinc-plated. Buried valves shall have stainless steel fasteners.			
ACCEPTABLE PRODUCTS			
Mueller Company 2361 or 2362		Clow 2639 Full Body DI	

Pressure Regulating Valve

TYPE OF VALVE		SYMBOL	
Pressure Relief and Pressure Sustaining Valve		PRV-1	
VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIALS	Type of Service	Water
Body & Cover	Ductile Iron	Reference Document	CSA or ASME Certification
Trim	Bronze	Size Range	1" – 36"
Disc Retainer & Diaphragm Washer	Cast Iron	Body/Valve Ends	NPT, FNPT (Note 3)
Disc	Bune-N®Rubber	Pressure Rating (psi)	150 PSI (Note 2)
Stem, Nut & Spring	Stainless Steel	Temperature Rating (deg C)	-
		Testing	-
Coating	Epoxy	Operator	Position indicator
Lining	Epoxy	Actuator	-
NOTES			
1. Valve shall be NSF 61certified for potable water applications– Lead free.			
2. Valve shall be adjustable with range suitable for the installation.			
3. A strainer shall be provided ahead of all PRVs			
ACCEPTABLE PRODUCTS			
Cla-Val 50G-01BVKC with W/X101 position indicator and 0/75 psi range			

END OF SECTION

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SECTION 15100

VALVES

DATE:	August 11, 2022
CLIENT:	J-U-B Engineers, Inc.
PROJECT:	Booster station replacements – Phase II Re-Bid
ENGINEER:	Matthew L Barker, P.E.



A handwritten signature in black ink, appearing to read "m. l. barker".

<u>SPECIFICATION</u> <u>SECTION</u>	<u>SECTION</u> <u>DESCRIPTION</u>
16012	ELECTRICAL GENERAL
16112	ELECTRICITY METERING
16119	LOW-VOLTAGE CONDUCTORS AND CABLES
16123	CONTROL-VOLTAGE ELECTRICAL POWER CABLES
16126	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
16133	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
16143	UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS
16153	IDENTIFICATION FOR ELECTRICAL SYSTEMS
16155	MOTORS
16213	LOW-VOLTAGE DISTRIBUTION TRANSFORMERS
16231	GASEOUS ENGINE GENERATORS
16415	TRANSFER SWITCHES
16416	PANELBOARDS
16419	MOTOR-CONTROL CENTERS
16426	WIRING DEVICES
16430	ENCLOSED SWITCHES AND CIRCUIT BREAKERS
16453	VARIABLE-FREQUENCY MOTOR CONTROLLERS
16474	HARMONIC MITIGATION
16483	SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS
16519	LED INTERIOR LIGHTING
16539	LED EXTERIOR LIGHTING
16541	LIGHTING CONTROL DEVICES
16670	ELECTRICAL TESTING
16679	ELECTRICAL POWER MONITORING AND CONTROL
16851	HEATING VENTILATION AND AIR CONDITIONING
16906	PROCESS INSTRUMENTATIONS METERS AND TRANSMITTERS
16927	APPLICATION SOFTWARE
16928	CONTROL SYSTEM

The technical specification sections listed above have been prepared under the direction of the Professional Engineer, licensed in the State of Idaho, whose seal and signature appear above.

SECTION 16012
ELECTRICAL GENERAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Reference Section 01014 for Work Sequence.
- C. Reference Section 16015 for Electrical Work Sequence.
- D. Reference Section 01500 for Construction Facilities and Temporary Control.
- E. Reference Section 02315 for Trenching.
- F. Reference Section 02324 for Backfilling and Compacting for Utilities.
- G. Reference Division 9 for Finishes including paints and coatings.

1.2 SUMMARY

- A. Related Sections:
 - 1. Division 13, and Division 15 for electrical and mechanical coordination.

1.3 DEFINITIONS

- A. The words “plans” and “drawings” are used interchangeably in this specification and in all cases shall be interpreted to mean "drawings".
- B. The word “provide” shall be interpreted to mean furnish and install.
- C. “Owner” shall be the City of Moscow, Idaho.
- D. “Contractor” is the party who furnishes and installs all tools, materials and equipment. This includes the Prime Contractor, the Electrical Contractor, Control System Integrator, and all other Contractors and Sub Contractors.
- E. “Control System Integrator” (CSI) also referred to as the System Integrator or Integrator is the Party that furnishes all control components and designs the detailed control wiring diagrams plus the layout and assembly of the custom control panels.
- F. “Programmer” is the company selected by the Owner to provide the project programming.

- G. "Control System" includes all equipment, instruments and wiring for control and monitoring of all operating pumps and equipment. This includes custom control panels, motor control center, packaged control panels, and control equipment furnished with other systems and mechanical equipment. All sensing, transmitting, indicating, control and recording of all functions as specified and shown are also included in the control system.

1.4 SUBMITTAL REQUIREMENTS

- A. Submittals shall comply with the requirements of specification Section 01300 in addition to the requirements in this Section and other Division 16 Sections.
- B. The Contractor shall prepare and submit to the Engineer a Schedule of Submittals prior to the approval of material submittals. The Schedule of Submittals shall comprise a comprehensive list of all submittals required to be submitted by the Contractor for the project and a rough outline of the days that those submittals will be received. The submittal schedule shall be organized by specification section and broken down into Action, Informational and Closeout submittals.
- C. Shop Drawings and Samples:
 - 1. Where required by these Specifications, the Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with Section 01300 and other Division 16 Sections. Each submittal will be identified as Engineer may require.
 - a. Shop Drawings
 - 1) Shop drawings shall be submitted in electronic PDF format or physical copies on non-folded sheets no larger than 11"x17". PDF submittals shall be clear and legible. If submitting physical copies, submit number of copies specified in the respective specification section.
 - 2) Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 1.4.C.4.
 - b. Samples
 - 1) Submit number of Samples specified in the Specifications or as requested by the Engineer.
 - 2) Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and

other data as Engineer may require enabling Engineer to review the submittal for the limited purposes required by Paragraph 1.4.C.4.

2. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineers review and approval of the pertinent submittal ~~will~~ shall be at the sole expense and responsibility of Contractor.

D. Submittal Procedures

1. Before submitting each Submittal, Shop Drawing or Sample, Contractor shall have determined and verified the following:
 - a. All field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto.
 - b. The suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work.
 - c. All information relative to Contractor's responsibilities for means, methods, techniques, sequences, procedures of construction, and safety precautions and programs incident thereto.
 - d. Contractor has reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Submittal, Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be indicated both as a written communication separate from the Shop Drawing or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.
4. Provide cut sheets for all products with a Bill of Materials showing quantity, manufacturer, catalog number, and the supplier name and phone number and relevant spec. paragraph number. Number each item in the bill of materials and relate the bill of materials to the submitted product index.
5. Identify on the cut sheets the exact model number, including any options, and the intended use of each item. Identification shall be by tag number of the

equipment as shown on the drawings or a description of where it will be used. Submittals that are not clear as to the intended use of each item it contains will be rejected.

6. All Submittals and Shop Drawings shall be reviewed, signed and dated prior to Engineers review by;
 - a. General Contractor.
 - b. Electrical Contractor.
 - c. Control System Integrator.

E. Engineer's Review

1. The Engineer will provide timely review of Submittals, Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 1.4.D.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 1.4.D.1.

F. Resubmittal Procedures

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Submittals and Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

1.5 ACTION SUBMITTALS

- A. Schedule of Submittals organized by specification section and including the following:
 - 1. Action, Informational and Closeout submittal subcategories for each specification section.
 - 2. Unique submittal number.
 - 3. Name of submittal.
 - 4. Anticipated date of submission.
 - 5. Summary of submittal content.
- B. Project Schedule in Gantt chart format that outlines the project work tasks with duration, start and finish dates.

1.6 CLOSEOUT SUBMITTALS

- A. OPERATION AND MAINTENANCE MANUALS
 - 1. The Contractor shall prepare and assemble detailed operation and maintenance manuals in accordance with the project general requirements and other requirements in Section 01730. The manuals shall be bound in a 3-ring binder and tabbed with an index, in general the O&M manual format shall meet that of the submittal data in Division 16 sections. The manuals shall include, but not be limited to, the following:
 - a. Catalog data and complete parts list for all equipment and devices.
 - b. All cut sheets of equipment and components.
 - c. Preventative maintenance procedures
 - d. Trouble-shooting
 - e. Calibration
 - f. Testing
 - g. Replacement of components
 - h. Automatic mode operation
 - i. Manual mode operation
 - j. System schematics / shop drawings and record drawings.

- k. As-built wiring diagrams of cabinet and enclosure contained assemblies
 - l. As-built wiring diagrams of overall system
 - m. Listing of recommended spare parts
 - n. Listing of recommended maintenance tools and equipment.
- B. Operations and Maintenance Training Outline:
 - 1. Submit Training Outlines once prior to conducting required training. Outlines shall be submitted at least two weeks in advance of conducting the required training.
 - 2. Submit Training Outlines signed by each person instructed after the completion of the required training.

1.7 GENERAL WORK REQUIREMENTS

- A. The Contractor shall provide all labor, material, tools, equipment and services required to complete the furnishing, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical equipment, devices and components as indicated and implied by the plans and these specifications.
- B. Complete the wiring to, connection to, adjustment and calibration of, testing of equipment having electric motors and/or built-in or furnished electrical components. Install electrical components that are furnished with mechanical equipment.
- C. Complete the procurement, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical devices, components, accessories and equipment which is not shown or specified but which is nonetheless required to make the systems shown and specified function properly.
- D. The Contractor shall install and make all connections to the equipment furnished by the Owner.
- E. Provide the size, type and rating of motor control devices, equipment and wiring necessary to match the ratings of motors furnished with mechanical equipment.
- F. Provide adequate space for the electrical installation, including but not limited to, determination of access-ways and doorways, shipping sections, wall and floor space, and space occupied by mechanical equipment. Provide electrical equipment that fits in the areas shown on the drawings. All equipment shall be readily accessible for maintenance, shall have electrical clearances in accordance with NEC and shall be installed in locations that will provide adequate cooling.

- G. Check electrical equipment prior to installation so that defective equipment is not installed. Acceptance testing for electrical equipment shall be performed as discussed in Sections 16670 and 16928.
- H. Provide start-up, follow-up and training of the Owner's personnel for electrical systems. Make all corrective measures required during start-up. See specific requirements for training and start-up in other specification sections.
- I. Provide field services of qualified technicians to supervise and check out the installation of the equipment, to supervise and check out interconnecting wiring, to conduct start-up of operation of the equipment, and to correct any problems, which occur during start-up.
- J. Provide circuit breakers, conduit, wire and installation for all items, which require 120 VAC power.
- K. Provide demolition of existing equipment indicated on the drawings per specification section 16013.
- L. The MCC's (motor control centers), transfer switches, PLC's, control panels, and instrumentation shall be supplied through the Control System Integrator.
- M. Contractor shall attend an On-Site pre-submittal meeting with the General Contractor, Electrical Contractor, Control Systems Integrator, Owner and Engineers prior to submittals.

1.8 PROJECT DESCRIPTION

- A. The project generally includes electrical and controls to support two new pump booster stations with standby generators; modify and install Owner provided telemetry panels; pump controls; HVAC and ventilation system; lighting and receptacles; site lighting; electrical service.
- B. It is the intent of these documents to describe the work required to complete this project in sufficient detail to secure comparable bids. All parts or work not specifically mentioned which are necessary in order to provide a complete installation shall be included in the bid and shall conform to all Local, State and Federal requirements.
- C. Provide electrical upgrades, additions and modifications as indicated on the drawings.

1.9 PROJECT CONDITIONS

- A. Do not install electrical or control equipment and hardware that are wet, moisture damaged, or mold damaged.
- B. Environmental Limitations: Do not deliver or install electrical distribution, motor control, control panels, and other electrical apparatus until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete,

and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

- C. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit work to be performed according to manufacturer's written instructions and warranty requirements.
- D. Field Measurements: Verify actual dimensions of openings and available space by field measurements before fabrication.

1.10 AREA CLASSIFICATIONS

- A. The following classification of areas shall be used as a reference in determining application of material covered in Division 16 Sections unless specifically shown otherwise on the drawings. Areas which fall under two or more of the following classifications shall conform to the minimum requirements of all area classifications listed for that area. Hazardous area classifications shall be defined by NFPA 70, NFPA 820 and the Area Classification plan sheets included in the Contract Documents.
- B. Outdoor Wet and/or Damp Areas:
 - 1. All outdoor areas.
- C. General Purpose Areas:
 - 1. Indian Hills Booster Station
 - 2. Ponderosa Booster Station

1.11 COORDINATION

- A. Equipment Coordination
 - 1. The Contractor is responsible to coordinate the equipment supplied from various manufacturers. This includes but is not limited to:
 - a. Obtaining specific information on equipment ratings and sizes and verifying the electrical components supplied meet, or match the requirements such as voltage, phase, frequency, starter types, etc.
 - b. Verifying the equipment supplied will fit within the space allocated.
 - c. Coordination of equipment and the electrical power and control requirements. Provided in all sections of the specifications and drawings.

- d. Providing power and control equipment, wiring, and raceways to meet the requirements of the mechanical equipment supplied.
 - e. Providing all necessary control wiring and components for any special requirements from an equipment manufacturer.
- 2. The Contractor shall verify as a minimum:
 - a. Correct voltage, phase and frequency
 - b. Size and space requirements
 - c. Mounting requirements
 - d. Correct motor starter type
 - e. Proper coordination with the controls and control system Integrator.
- 3. Any discrepancies between the electrical and other equipment shall be brought to the immediate attention of the Engineer.
- 4. The Contractor shall assure that no instrumentation or control interferences are created by the variable frequency drives (VFD's) or load wiring. The Contractor shall coordinate with the VFD manufacturer to provide necessary separation of conductors or shielding and/or filtering equipment as required by the VFD manufacturer. If interferences do occur, the Contractor shall be responsible to take corrective action at no additional cost to the Owner.

1.12 ELECTRICAL WORK SEQUENCE

- A. The Contractor shall submit a detailed plan for the Work, portions of which are listed herein, for general review and consideration by the Owner and Engineer. In all cases, operation of existing plant equipment and processes must be maintained to maintain compliance with the Owner's NPDES Permit.
- B. Some work elements may be done simultaneously. Not all construction activities are noted. Coordinate construction schedule to incorporate the listed Major Work Elements items as a minimum.

1.13 FINAL ACCEPTANCE

- A. Prior to final acceptance the Engineer will perform one or more site observation trips to develop a "punch list" of items deemed incomplete. The Electrical Contractor and Control System Integrator shall be present while these inspections are taking place and shall be available for opening cabinets and operating and adjusting the system as is necessary for the Engineer to verify all equipment is installed and operates to the requirements of the contract documents. The contractor shall anticipate a minimum of 16 hours to complete the final acceptance testing.

- B. Prior to the Contractor calling for this observation, the Contractor shall have completed all items of work, including wire markers, nameplates, final tests and final test reports. All equipment shall be checked for proper operation and all signals verified for correct calibration and wiring.
- C. Final acceptance will not be given until:
 - 1. All work is complete.
 - 2. All punch-lists are checked off and returned to the Engineer.
 - 3. All test reports are received.
 - 4. All O&M manuals are received.
 - 5. All spare parts are received.
 - 6. All instrument test forms are received.
 - 7. All project record drawings are received.
- D. Punch Lists
 - 1. Each punch list item shall be completed by the Contractor and checked off of the list. When all of the items on the list are completed or commented on, the list shall be signed by the Contractor and returned to the Engineer for verification.

1.14 PROJECT RECORD DRAWINGS

- A. A set of drawings shall be maintained at the job site (by the Electrical Contractor) showing any deviations in the electrical systems from the original design.
- B. This set of drawings shall be readily available for inspection by the Engineer at all times. The Engineer will check the Red-Lined As-Built drawings after each project meeting.
- C. Another complete set of drawings shall be marked up in the office showing the changes made on the field set of drawings. All changes shall be clearly marked in red on the drawings. Drawings shall be submitted to the Engineer at the completion of the project.
- D. A set of electrical drawings marked in red to indicate the routing of conduit runs, shall be submitted to the Engineer for review at the completion of conduit rough-in and prior to cover or pouring of concrete.

1.15 GUARANTEE

- A. The Contractor shall guarantee his work and all components thereof, excluding incandescent and fluorescent lamps for a period of 1 year from date of acceptance of installation. The Contractor shall remedy any defects in workmanship, failure to meet

desired or designed outcome and repair or replace any faulty equipment that shall appear within the guarantee period without additional cost to the Owner.

1.16 CLEANUP

- A. The premises must be kept free of accumulated materials, rubbish and debris at all times. Surplus material, tools and equipment must not be stored at the job site. At the completion of the job, all equipment and fixtures shall be left clean and in proper condition for their intended use.
- B. All motor control centers (MCC's), Panelboards, and control panels shall be cleaned inside and out at the completion of the project.

1.17 TESTS

- A. Testing for installed feeder cables and motors is required as specified in Sections 16670, 16119, and 16155. Instrumentation devices and wiring shall be tested as specified in Sections 16670, 16123 and 16928. Test reports shall be submitted to the Engineer prior to final acceptance. All tests shall be performed in accordance with the applicable sections of NETA.

1.18 MAINTAINED OPERATION REQUIREMENTS

- A. This is an existing and operating facility. The existing systems must remain operational during construction.

1.19 OPERATION AND MAINTENANCE TRAINING (OWNER INSTRUCTION)

- A. General:
 - 1. The Contractor and appropriate factory-trained representatives shall instruct the Owner's representative in the proper operation and maintenance of all electrical and control systems and equipment, and shall explain all warranties.
- B. Training Agenda Outline:
 - 1. Prior to instruction of Owner Personnel, the Contractor shall prepare a typed outline, listing the subjects that will be included in this instruction, and shall submit the outline for review by the Engineer at least 2 weeks prior to the time of the training.
- C. Training Requirements:
 - 1. Training shall be provided per the specific requirements in other sections of these specifications. In addition to training required in other sections of the specifications, the Contractor shall conduct specifically organized training sessions in the overall operation and maintenance of the electrical and control system for personnel employed by the Owner. The training sessions shall be

conducted to educate and train the personnel in operations and maintenance of all components of the electrical system outside the training requirements in the other Sections.

2. Training shall include, but not be limited to, the following:
 - a. Preventative maintenance procedures
 - b. Trouble-shooting
 - c. Calibration
 - d. Testing
 - e. Replacement of components
 - f. Equipment operation
3. At a minimum, 2 training session, each at least 6 hours in duration, shall be conducted at the facility after start-up of the electrical and control systems. The Contractor shall prepare and assemble specific instruction materials for each training session and shall supply such materials to the Owner at least 2 weeks prior to the time of the training.

D. Certification:

1. At the conclusion of the instruction period, the Contractor shall obtain the signature of each person being instructed on each copy of the approved training outline to signify that the personnel has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.

E. Other Requirements:

1. Refer to other Division 16 Sections for additional Operator Training requirements for specific pieces of equipment or specific systems.
2. The Contractor shall coordinate the Operator Training requirements listed above with the Owner Instruction requirements of Division 1.

1.20 DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment to the job site at the appropriate time for installation. Equipment items shall be crated or affixed to pallets with protective wrappings. Exercise care to prevent damage from handling. Store mechanical and electrical components and conductors off the ground in weathertight enclosures. Keep equipment and all electrical components dry at all times.
- B. Conductors shall be protected from damage at all times.

1. Conductors shall not be in contact with Earth.
 2. Conductors shall be protected from foot traffic.
 3. Any conductor deemed damaged by the engineer shall be replaced.
- C. Reference Division 1.

PART 2 PRODUCTS

2.1 ELECTRICAL LOCKOUT DEVICES

- A. Contractor shall provide two Lockout Stations and two Breaker lockout Center. Install one set of lockout equipment in each pump house per direction of engineer.
- B. Lockout Stations shall include a heavy duty acrylic board with polycarbonate lock retention blocks.
1. Included accessories shall include (4) Padlocks, (10) lockout tags with ties, (4) 1-1/2" multiple lockout device. Prinzing LC203G or approved equal.
- C. Breaker Lockout Centers shall include (1) Padlock, (1) lockout tag with ties, (1) single pole breaker lockout, (1) multi pole breaker lockout. Prinzing 3075 or approved equal.

END OF SECTION

SECTION 16112
ELECTRICITY METERING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes work to accommodate utility company revenue meters, and Owner's electricity meters used to manage the electrical power system.
- B. Section includes utility upgrade requirements and division of responsibility.

1.3 DEFINITIONS

- A. CT: Current Transformer
- B. KY or KYZ Pulse: Term used by the metering industry to describe a method of measuring consumption of electricity (kWh) that is based on a relay opening and closing in response to the rotation of the disk in the meter. Electronic meters generate pulses electronically.

1.4 ACTION SUBMITTALS

- A. Product Data:
 - 1. For each type of product indicated.
 - 2. For metering infrastructure components.
 - 3. For metering software.
- B. Shop Drawings: For electricity-metering equipment.
 - 1. Include elevation views of front panels of control and indicating devices and control stations.
 - 2. Include diagrams for power, signal, and control wiring.
 - 3. Wire Termination Diagrams and Schedules: Include diagrams for power, signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and

show circuit protection features. Differentiate between manufacturer-installed and field-installed wiring.

4. Include series-combination rating data for modular meter centers with main disconnect device.
5. Retain "Block Diagram" Subparagraph below if this Section includes PC-based local area data bus or link to BAS.
6. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices used. Describe characteristics of network and other data communication lines.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Submit evidence that meters are compatible with connected monitoring and control devices and systems specified in Section 16679 "Electrical Power Monitoring and Control."
 1. Show interconnecting signal and control wiring, and interface devices to show compatibility of meters.
 2. For reporting and billing interfaces and adapters, list network protocols and provide statements from manufacturers that input and output devices comply with interoperability requirements of the protocol.
- B. Qualification Data: For testing agency.
- C. Field quality-control reports.
- D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: In addition to items specified in Section 01730 "Operation and Maintenance Data," include the following:
 1. Application and operating software documentation.
 2. Software licenses.
 3. Software service agreement.
 4. Device address list.

5. Hard copies of manufacturer's operating specifications, user's guides for software and hardware, and PDF files on a USB storage device of hard-copy Submittal.
6. Meter data sheet for each meter, listing nameplate data and serial number, accuracy certification, and test results.
7. Meter installation and billing software startup report.

1.7 SCHEDULING WORK WITH THE UTILITY COMPANY:

- A. The Contractor shall be fully and completely responsible for all scheduling and coordination with the utility company. The Contractor shall coordinate and schedule power outages, power service for operation and construction, and power service as may be required by the facility prior to Certificate of Occupancy.
- B. The Contractor shall make all necessary applications for service with the utility and shall notify the Owner in writing of any obligations that the Owner must fulfill for the service to be started, installed or modified.

1.8 CONTRACTOR/UTILITY INTERFACE RESPONSIBILITIES:

- A. The electrical utility providing service to these facilities is Avista. Contact Darrel Haarr at 509-336-6238 for electrical service installation.
- B. The division of responsibilities has been determined by coordination with the utility. The Contractor shall comply with all utility company standards and requirements.

1. For each site, the Contractor shall:

- a. Provide trenching, backfill and borrow material for primary service, from the new transformer pad to the point of connection to the utility's primary system.
- b. Install primary conduit and transformer pad, supplied by Utility.
- c. Provide trenching, backfill and borrow material for the secondary service.
- d. Provide underground secondary conduit from the utility Co. transformer to the main breaker.
- e. Provide the meter enclosure, support and conduit between the meter base and transformer.

2. For each site, the Utility Company will:

- 1) Provide primary service conductors to new transformer.

- 2) Provide new service transformer and terminate primary and secondary conductors.
 - 3) Provide and install meters in Contractor supplied enclosure.
 - 4) Provide conductors from the utility Co. transformer to the meter enclosure.
- C. All utility company charges for and related to the final permanent service to the facilities will be paid by the Owner directly to the utility company and shall not be included in the Contractor's bid price.

1.9 TEMPORARY CONSTRUCTION POWER

- A. Provide a separately metered temporary power service for construction power. Provide power for operation of all equipment during testing. Provide power for operation of all equipment including lighting and HVAC equipment until certificate of occupancy is obtained. All coordination with the utility and associated construction costs for temporary construction power shall be paid for by the Contractor. The Contractor shall pay for the energy costs as billed by the utility.

1.10 QUALITY ASSURANCE

- A. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with all serving utility company standards and requirements.
- C. Service equipment shall be listed and labeled by UL as "suitable for use as service equipment."

1.11 FIELD CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
1. Owner shall be notified and issued written permission no fewer than two days in advance of proposed interruption of electrical service.
 2. Do not proceed with interruption of electrical service without Water Department's written permission.
 3. Notify Owner in writing and submit a detailed outage plan for approval prior to beginning work. Reference Section 01014 and 16015 for additional requirements for continuity of operations.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 916.

2.2 UTILITY METERING INFRASTRUCTURE

- A. Install metering accessories furnished by the utility company, complying with its requirements.
- B. Utility-Furnished Meters: Connect data transmission facility of metering equipment installed by the Utility.
- C. Current-Transformer Cabinets: Comply with requirements of electrical-power utility company.
- D. Meter Sockets:
 - 1. Comply with requirements of electrical-power utility company.
 - 2. Steady-state and short-circuit current ratings shall meet indicated circuit ratings.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with equipment installation requirements in NECA 1.
- B. Install meters furnished by utility company. Install raceways and equipment according to utility company's written instructions. Provide empty conduits for metering leads and extend grounding connections as required by utility company.
- C. Install modular meter center according to switchboard installation requirements in NECA 400.

3.2 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 16153 "Identification for Electrical Systems."

3.3 UTILITY REQUIREMENT VERIFICATION

- A. The Contractor shall coordinate and submit all equipment, materials, etc. related to the utility work to the serving utility to verify conformance to the Utility's requirements for service. The Contractor shall also submit any plans for the installation of the primary and secondary service for approval by the Utility prior to excavation. Any discrepancy between the Utility requirements and the Contract documents shall be brought to the immediate attention of the Engineer.

3.4 TESTING

- A. Comply with requirements of Section 16670.

END OF SECTION

SECTION 16119
LOW-VOLTAGE CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Copper building wire rated 600 V or less.
- 2. Metal-clad cable, Type MC, rated 600 V or less.
- 3. Armored cable, Type AC, rated 600 V or less.
- 4. Mineral-insulated cable, Type MI, rated 600 V or less.
- 5. Tray cable, Type TC, rated 600 V or less.
- 6. Connectors, splices, and terminations rated 600 V and less.

- B. Related Requirements:

- 1. Section 16123 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2, and 3 control cables.

1.3 DEFINITIONS

- A. Retain terms that remain after this Section has been edited for a project.
- B. PV: Photovoltaic.
- C. RoHS: Restriction of Hazardous Substances.
- D. VFC: Variable-frequency controller.
- E. EPDM: Ethylene-propylene-diene terpolymer rubber.
- F. NBR: Acrylonitrile-butadiene rubber.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: Indicate type, use, location, and termination locations.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
- B. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.
- C. Comply with NFPA 70.

PART 2 PRODUCTS

2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alpha Wire Company.
 - 2. American Bare Conductor.
 - 3. Belden Inc.
 - 4. Cerro Wire LLC.
 - 5. Encore Wire Corporation.
 - 6. General Cable Technologies Corporation.
 - 7. Okonite Company (The).

8. Service Wire Co.
 9. Southwire Company.
 10. WESCO.
- C. Standards:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 2. RoHS compliant.
 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 and ASTM B496 for stranded conductors.
- E. Conductor Insulation:
1. Type THHN and Type THWN-2: Comply with UL 83 and NEMA WC 70.
 2. Type XHHW and Type XHHW-2: Comply with UL 44 and NEMA WC 70.
- F. Shielded Power Cable:
1. Type TC-ER: Cable designed for use with VFCs, with oversized crosslinked polyethylene insulation, spiral-wrapped foil plus 85 percent coverage braided shields and insulated full-size ground wire, dual spirally wrapped copper tape shields and three bare symmetrically applied ground wires, and sunlight- and oil-resistant outer PVC jacket.
 2. For motors 150HP and less driven by VFD's, provide shielded power cables with integral ground for the motor leads between variable frequency drives and the motors. Cables shall be 600V, UL 1277, Type TC-ER per NEC Article 336, rated 90 Degrees C Wet/Dry. Shielding shall be tinned copper braid and tinned copper drain wire- Belden 29500 series or equal.

2.2 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Okonite Company (The).
 2. General Cable Technologies Corp.
 3. Belden, Inc.
 4. Southwire Company.
- C. Standards:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 2. Comply with UL 1569.
 3. Hazardous Location: Metal-clad cable used in hazardous locations shall be listed and labeled as type MC-HL for use in Class I, II and III, Division 1 and 2 areas.
 - a. MC-HL cable shall be installed using appropriate fittings listed and labeled for use with type MC-HL cable and approved for the classified area in which they are installed.
 4. RoHS compliant.
 5. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Circuits:
1. Single circuit and multi-circuit with color-coded conductors.
 2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.
- E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- F. Ground Conductor: Bare.
- G. Conductor Insulation:
1. Type TFN/THHN/THWN-2: Comply with UL 83.
 2. Type XHHW-2: Comply with UL 44.
- H. Armor: Aluminum, interlocked.
- I. Fittings: Stainless steel.

- J. Jacket: PVC applied over armor.

2.3 ARMORED CABLE, TYPE AC

- A. Description: A factory assembly of insulated current-carrying conductors with or without an equipment grounding conductor in an overall metallic sheath.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Atkore International (AFC Cable Systems).
 - 2. Belden Inc.
 - 3. General Cable Technologies Corporation.
 - 4. Okonite Company (The).
 - 5. Service Wire Co.
- C. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. Not all Type AC cable will comply with RoHS requirements, such as some types with galvanized-steel armor. Consult manufacturer.
 - 3. RoHS compliant.
 - 4. Comply with UL 4.
 - 5. See the Evaluations for discussion of UL's "Wire and Cable Marking and Application Guide."
 - 6. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Circuits:
 - 1. Single circuit and multicircuit with color-coded conductors.
 - 2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.
- E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

- F. Ground Conductor: Insulated.
- G. Conductor Insulation: Type THHN/THWN-2. Comply with UL 83.
- H. Armor: Aluminum, interlocked.

2.4 MINERAL-INSULATED CABLE, TYPE MI

- A. Description: Solid copper conductors encased in compressed metal oxide with an outer metallic sheath, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. KME America, Inc.
 - 2. nVent.
 - 3. Watlow Electric Manufacturing Company.
- C. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. UL 2196 for fire resistance.
 - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B3 for bare annealed copper.
- E. Insulation: Compressed magnesium oxide.
- F. Sheath: Copper. Stainless steel and Alloy 600/825 also available (alloys 600 and 825 are highly corrosion resistant alloys consisting of primarily nickel, iron and chromium)

2.5 TRAY CABLE, TYPE TC

- A. Description: A factory assembly of insulated current-carrying conductors with or without an equipment grounding conductor in a nonmetallic jacket.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Belden Inc.

2. General Cable Technologies Corporation.
 3. Okonite Company (The).
 4. Southwire Company.
- C. Standards:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 2. Not all Type TC cable may comply with RoHS requirements. Consult manufacturer.
 3. RoHS compliant.
 4. Comply with UL 1277.
 5. Comply with ICEA S-73-532/NEMA WC 57 for Type TC cables used for control, thermocouple extension, and instrumentation.
 6. Comply with ICEA S-95-658/NEMA WC 70 for Type TC cables used for power distribution.
 7. See the Evaluations for discussion of UL's "Wire and Cable Marking and Application Guide."
 8. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- E. Ground Conductor:
1. Unshielded Power Cable: Bare.
 2. Shielded Power Cable: Insulated.
- F. Conductor Insulation: Type XHHW-2. Comply with UL 44.
- G. Shield:
1. Unshielded Power Cable: None
 2. Shielded Power Cable: Overall Aluminum/Polyester foil 100% coverage with 85% coverage tinned copper braid outer shield and tinned copper drain wire.

2.6 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. 3M Electrical Products.
 - 2. ABB (Electrification Products Division).
 - 3. Emerson Electric Co. (Automation Solutions - Appleton - O-Z/Gedney).
 - 4. ILSCO.
 - 5. NSi Industries LLC.
 - 6. Raychem.
- C. Mechanical Multi-Tap Connectors: Insulated mechanical tap connectors with removeable screw and port caps. ILSCO Nimbus PBTS series or approved equal.
- D. Underground Splices:
 - 1. Mechanical Multi-Tap Splice: Watertight, insulated mechanical splices with number and size of ports as required for the application. Material shall be high-strength aluminum alloy with resealable tethered wire and screw ports. ILSCO Safetysub PDSS series or approved equal.
 - 2. Heat Shrink Splice Sleeves: Watertight, heat shrink splice kits with dual rated tin-plated aluminum mechanical splice for copper and aluminum conductors with heavy wall heat shrink sleeve.
- E. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- F. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
 - 1. Material: Copper.
 - 2. Type: Two hole with long barrels.
 - 3. Termination: Compression.

G. Motor Terminal Splice Insulation

1. Provide motor terminal splice insulation in the motor connection box that will withstand constant vibration and abrasion without degrading the insulation of the splice. A product shall be used that is specifically designed for the purpose of motor terminations.
2. For motor splices in general purpose areas use a bolted splice with a boot-type motor stub splice insulator with integral TY RAP cable ties. Thomas & Betts MSC series or equal. For splices using wire larger than 8 AWG, it is also acceptable to use a heat shrinkable motor stub splice connection kit, Raychem, MCK-V or equal.
3. For motors in outdoor, damp or corrosive environments, use a waterproof motor stub insulator, Thomas & Betts multi-splice insulator MSLT series or equal. For splices using wire larger than 8 AWG, it is also acceptable to use a heat shrinkable motor stub splice connection kit, Raychem, MCK-V series or equal.

PART 3 EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. Control Conductors: Copper Stranded.
- D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type XHHW-2, single conductors in raceway.
- B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.
- E. Feeders Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway.

- F. Feeders in Cable Tray: Type THHN/THWN-2, single conductors in raceway.
- G. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
- I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.
- J. Branch Circuits Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway.
- K. Branch Circuits in Cable Tray: Type THHN/THWN-2, single conductors in raceway.
- L. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- M. Class 1 Control Circuits: Type THHN/THWN-2 in raceway.
- N. Class 2 Control Circuits: Type THHN/THWN-2 in raceway.
- O. VFC Output Circuits: Type XHHW-2 in metal conduit or Type TC-ER cable with braided shield as indicated on the Conduit and Wire Schedule.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 16133 "Raceways and Boxes for Electrical Systems" and Section 16143 "Underground Ducts and Raceways for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- F. Support cables according to Section 16129 "Hangers and Supports for Electrical Systems."

- G. Complete cable tray systems installation according to Section 16136 "Cable Trays for Electrical Systems" prior to installing conductors and cables.
- H. Conductor Spacing:
 - 1. Unless specifically shown otherwise on the drawings, in all areas maintain a minimum 2-inch separation between all conductors of different voltages. For parallel runs over 6 feet, maintain the following minimum separation between conductors:
 - a. Signal (12/24) VDC and 120 VAC – 6 inches
 - b. Signal (12/24) VDC and 480 VAC – 12 inches
 - c. 120 VAC control wire and 480 VAC – 2 inches
- I. Wire Bending Radius:
 - 1. The radius of bends in all wire (conductors and cables) shall not be less than five (5) times the outside diameter of the wire. Any wire installed with bends less than five times the diameter which the engineer deems has caused that insulation to be damaged shall be removed and new wire shall be installed.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Retain subparagraph below if aluminum conductors are specified.
 - 2. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors. Splices for aluminum conductors shall be compression type.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 16153 "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections as specified in Section 16670 "Electrical Testing".

END OF SECTION

SECTION 16119 – 12

**LOW-VOLTAGE
CONDUCTORS AND CABLES**

SECTION 16123
CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Backboards.
 - 2. Category 5e balanced twisted pair cable.
 - 3. Category 6 balanced twisted pair cable.
 - 4. Category 6a balanced twisted pair cable.
 - 5. Balanced twisted pair cabling hardware.
 - 6. RS-485 cabling.
 - 7. Low-voltage control cabling.
 - 8. Control-circuit conductors.
 - 9. Identification products.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- C. Plenum: A space forming part of the air distribution system to which one or more air ducts are connected. An air duct is a passageway, other than a plenum, for transporting air to or from heating, ventilating, or air-conditioning equipment.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency, RCDD, layout technician, installation supervisor, and field inspector.
- B. Source quality-control reports.
- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262, by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.
 - 1. Flame Travel Distance: 60 inches or less.
 - 2. Peak Optical Smoke Density: 0.5 or less.
 - 3. Average Optical Smoke Density: 0.15 or less.
- C. Flame Travel and Smoke Density for Riser Cables in Non-Plenum Building Spaces: As determined by testing identical products according to UL 1666.
- D. Flame Travel and Smoke Density for Cables in Non-Riser Applications and Non-Plenum Building Spaces: As determined by testing identical products according to UL 1685.
- E. RoHS compliant.

2.2 BACKBOARDS

- A. Description: Plywood. Comply with requirements for plywood backing panels in Section 06100 "Rough Carpentry."

2.3 CATEGORY 5E BALANCED TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 5e cable at frequencies up to 100 MHz.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Belden Inc.
 - 2. Berk-Tek Leviton; a Nexans/Leviton alliance.
 - 3. CommScope, Inc.
 - 4. Turck.
- C. Standard: Comply with ICEA S-90-661, NEMA WC 63.1, and TIA-568-C.2 for Category 5e cables.
- D. Conductors: 100-ohm, 24 AWG solid copper.
- E. Shielding/Screening: Unshielded twisted pairs (UTP).
- F. Cable Rating: Cable ratings shall be as required per application. Cables installed in Risers and Plenums shall be listed and labeled for such use as required per NFPA 70.
- G. Jacket: Blue, yellow, grey or white thermoplastic, per Owner's color convention.

2.4 CATEGORY 6 BALANCED TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6 cable at frequencies up to 250MHz.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Belden CDT Networking Division/NORDX.
 - 2. Berk-Tek Leviton; a Nexans/Leviton alliance.
 - 3. CommScope, Inc.
 - 4. Turck.

- C. Standard: Comply with NEMA WC 66/ICEA S-116-732 and TIA-568-C.2 for Category 6 cables.
- D. Conductors: 100-ohm, 23 AWG solid copper.
- ~~E.~~ Shielding/Screening: Shielded twisted pairs (FTP)
- F. Cable Rating: Cable ratings shall be as required per application. Cables installed in Risers and Plenums shall be listed and labeled for such use as required per NFPA 70.
- G. Jacket: Blue, yellow, grey or white thermoplastic, per Owner's color convention.

2.5 CATEGORY 6A BALANCED TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6a cable at frequencies up to 500MHz.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Belden CDT Networking Division/NORDX.
 - 2. Berk-Tek Leviton; a Nexans/Leviton alliance.
 - 3. CommScope, Inc.
 - 4. Turck.
- C. Standard: Comply with TIA-568-C.2 for Category 6a cables.
- D. Conductors: 100-ohm, 23 AWG solid copper.
- E. Shielding/Screening: Shielded twisted pairs (FTP)
- F. Cable Rating: Cable ratings shall be as required per application. Cables installed in Risers and Plenums shall be listed and labeled for such use as required per NFPA 70.
- G. Jacket: Blue, yellow, grey or white thermoplastic, per Owner's color convention.

2.6 BALANCED TWISTED PAIR CABLE HARDWARE

- A. Description: Hardware designed to connect, splice, and terminate balanced twisted pair copper communications cable.

- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Belden Inc.
 2. Berk-Tek Leviton; a Nexans/Leviton alliance.
 3. CommScope, Inc.
- C. General Requirements for Balanced Twisted Pair Cable Hardware:
1. Comply with the performance requirements of Category 5e, Category 6 or Category 6a as required.
 2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
 3. Cables shall be terminated with connecting hardware of same category or higher.
- D. Source Limitations: Obtain balanced twisted pair cable hardware from same manufacturer as balanced twisted pair cable, from single source.
- E. Connecting Blocks: 66-style or 110-style IDC as indicated on the drawings and approved for use with the category of cable used. Provide blocks for the number of cables terminated on the block, plus 25 percent spare, integral with connector bodies, including plugs and jacks where indicated.
- F. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
1. Number of Terminals per Field: One for each conductor in assigned cables.
- G. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.
1. Features:
 - a. Universal T568A and T568B wiring labels.
 - b. Labeling areas adjacent to conductors.
 - c. Replaceable connectors.
 - d. 24 or 48 ports.

2. Construction: 16-gauge steel and mountable on 19-inch equipment racks.
 3. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.
- H. Patch Cords: Factory-made, four-pair cables in 48-inch lengths; terminated with an eight-position modular plug at each end.
1. Patch Cords for Category 6 and 6a: Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords shall have latch guards to protect against snagging.
 2. Patch Cords for Category 5e: Patch cords shall have color-coded boots for circuit identification.
- I. Plugs and Plug Assemblies:
1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair 100-ohm unshielded or shielded balanced twisted pair cable.
 2. Comply with IEC 60603-7-1, IEC 60603-7-2, IEC 60603-7-3, IEC 60603-7-4, and IEC 60603-7.5.
 3. Marked to indicate transmission performance.
- J. Jacks and Jack Assemblies:
1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair 100-ohm unshielded or shielded balanced twisted pair cable.
 2. Designed to snap-in to a patch panel or faceplate.
 3. Standards:
 - a. Category 5e, unshielded balanced twisted pair cable shall comply with IEC 60603-7-2.
 - b. Category 5e, shielded balanced twisted pair cable shall comply with IEC 60603-7-3.
 - c. Category 6, shielded balanced twisted pair cable shall comply with IEC 60603-7.5.

- d. Category 6a, shielded balanced twisted pair cable shall comply with IEC 60603-7.51.
 - 4. Marked to indicate transmission performance.
 - K. Faceplate:
 - 1. Two port, vertical single-gang faceplates designed to mount to single-gang wall boxes, unless otherwise indicated.
 - 2. Metal Faceplate: Stainless steel, complying with requirements in Section 16426 "Wiring Devices."
 - 3. For use with snap-in jacks accommodating any combination of balanced twisted pair, optical fiber, and coaxial work area cords.
 - a. Flush mounting jacks, positioning the cord at a 45-degree angle.
 - L. Legend:
 - 1. Machine printed, in the field, using adhesive-tape label.
 - 2. Snap-in, clear-label covers and machine-printed paper inserts.
- 2.7 RS-232 CABLE
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Allied Wire & Cable Inc.
 - 2. Belden Inc.
 - 3. General Cable Technologies Corporation.
 - B. PVC-Jacketed, TIA 232-F:
 - 1. Nine, No. 24 AWG, stranded (7x32) tinned copper conductors.
 - 2. Semi-Rigid Polyvinyl Chloride Insulation.
 - 3. Aluminum foil-polyester tape shield with 100 percent shield coverage.
 - 4. PVC jacket.
 - 5. Conductors are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.

6. NFPA 70 Type: Type CM.
 7. Flame Resistance: Comply with UL 1581.
 8. Belden 9539 or approved equal.
- C. Plenum-Type, TIA 232-F:
1. Ten, No. 24 AWG, stranded (7x32) tinned copper conductors.
 2. Fluorinated Ethylene Propylene insulation.
 3. Aluminum foil-polyester tape shield with 100 percent shield coverage.
 4. Low Smoke PVC jacket.
 5. Conductors are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 6. NFPA 70 Type: CMP
 7. Flame Resistance: Comply with NFPA 262.
 8. Belden 82505 or approved equal.

2.8 RS-485 CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Allied Wire & Cable Inc.
 2. Belden Inc.
 3. General Cable Technologies Corporation.
- B. Standard Cable: NFPA 70, Type CMG.
1. Paired, two twisted pairs, No. 28 AWG, stranded (7x36) tinned-copper conductors.
 2. Polyethylene Insulation.
 3. Aluminum-foil polyester tape shield with 100 percent coverage and tinned copper braid with 90% coverage.

4. Conductors are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 5. PVC jacket.
 6. Flame Resistance: Comply with UL 1685.
 7. Belden 9842 or approved equal.
- C. Plenum-Rated Cable: NFPA 70, Type CMP.
1. Paired, two twisted pairs, No. 24 AWG, stranded (7x32) tinned-copper conductors.
 2. Foam fluorinated ethylene propylene insulation.
 3. Aluminum foil-polyester tape with 100 percent shield coverage and tinned copper braid shield with 90% coverage.
 4. Conductors are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 5. Low Smoke PVC Jacket.
 6. Belden 82842 or approved equal.
 7. Flame Resistance: Comply with NFPA 262.

2.9 HIGH-TEMPERATURE RTD WIRE

- A. RTD Wire:
1. Three-conductor, No. 16 AWG, stranded (16x29) tinned-copper conductors.
 2. Fluorinated ethylene propylene insulation.
 3. Aluminum foil-polyester tape with 100 percent shield coverage and tinned copper braid with 85% coverage.
 4. Operating Temp Range: -70 degrees C to 200 degrees C.
 5. Belden 83703 or approved equal.

2.10 LOW-VOLTAGE CONTROL CABLE

- A. Paired Cable: NFPA 70, Type TC.

1. Single-Pair Cable: Twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors. Belden 9342 or approved equal.
 - a. Aluminum foil-polyester tape with 100 percent shield coverage with No. 16 AWG, stranded tinned copper drain wire.
 2. Multi-Pair Cable: Twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors with number of pairs as indicated on the drawings. Belden 9770 series or approved equal.
 - a. Aluminum foil-polyester tape with 100 percent shield coverage with No. 20 AWG, stranded tinned copper drain wire.
 3. PVC/Nylon insulation, color coded.
 4. PVC jacket.
 5. Flame Resistance: Comply with UL 1685.
- B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
1. Single-pair, twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors.
 2. PVC insulation.
 3. Unshielded.
 4. PVC jacket.
 5. Flame Resistance: Comply with NFPA 262.
 6. Belden 88760 or approved equal.

2.11 CONTROL-CIRCUIT CONDUCTORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Encore Wire Corporation.
 2. General Cable; General Cable Corporation.
 3. Southwire Company.
- B. Class 1 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.

- C. Class 2 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.
- D. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.
- E. Class 2 Control Circuits and Class 3 Remote-Control and Signal Circuits That Supply Critical Circuits: Circuit Integrity (CI) cable.
 - 1. Smoke control signaling and control circuits.
 - 2. Circuit Integrity Cable: Twisted shielded pair with 100% coverage aluminum-foil polyester tape, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.
- F. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.
 - 1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.
 - 2. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NRTL listed for fire-alarm and cable tray installation, plenum rated.

2.12 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test twisted pair cables according to TIA-568-C.2.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Test cables on receipt at Project site.
 - 1. Test each pair of twisted pair cable for open and short circuits.

3.2 INSTALLATION OF RACEWAYS AND BOXES

- A. Comply with requirements in Section 16133 "Raceways and Boxes for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 - 1. Comply with TIA-568-C Series of standards.
 - 2. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
 - 3. Cables may not be spliced and shall be continuous from terminal to terminal. Do not splice cable between termination, tap, or junction points.
 - 4. Cables serving a common system may be grouped in a common raceway. Install network cabling and control wiring and cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
 - 5. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - 6. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.
 - 7. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
 - 8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
 - 9. Support: Do not allow cables to lie on removable ceiling tiles.
 - 10. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
 - 11. Provide strain relief.

12. Keep runs short. Allow extra length for connecting to terminals. Do not bend cables in a radius less than 10 times the cable OD. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
 13. Ground wire shall be copper, and grounding methods shall comply with IEEE C2. Demonstrate ground resistance.
- C. Balanced Twisted Pair Cable Installation:
1. Comply with TIA-568-C.2.
 2. Do not untwist balanced twisted pair cables more than 1/2 inch at the point of termination to maintain cable geometry.
- D. Installation of Control-Circuit Conductors:
1. Install wiring in raceways.
 2. Comply with requirements specified in Section 16133 "Raceways and Boxes for Electrical Systems."
- E. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 30 inches apart.
 3. Cable shall not be run through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.
- F. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
 2. Install cabling after the flooring system has been installed in raised floor areas.
 3. Below each feed point, neatly coil a minimum of 72 inches of cable in a coil not less than 12 inches in diameter.
- G. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-D recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inches.
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.4 REMOVAL OF CONDUCTORS AND CABLES

- A. Remove abandoned conductors and cables. Abandoned conductors and cables are those installed that are not terminated at equipment and are not identified with a tag for future use.

3.5 CONTROL-CIRCUIT CONDUCTORS

- A. Minimum Conductor Sizes:
 - 1. Class 1 remote-control and signal circuits; No 14 AWG.
 - 2. Class 2 low-energy, remote-control, and signal circuits; No. 14 AWG.
 - 3. Class 3 low-energy, remote-control, alarm, and signal circuits; No 12 AWG.

3.6 FIRESTOPPING

- A. Comply with requirements in Section 07840 "Through Penetration Firestopping"
- B. Comply with TIA-569-D, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping" Chapter.

3.7 GROUNDING

- A. For data communication wiring, comply with TIA-607-B and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.
- B. For low-voltage control wiring and cabling, comply with requirements in Section 16126 "Grounding and Bonding for Electrical Systems."

3.8 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 16153 "Identification for Electrical Systems."

3.9 FIELD QUALITY CONTROL

- A. Perform tests and inspections as specified in Section 16670 "Electrical Testing".

END OF SECTION

SECTION 16126
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- 1. Section includes grounding and bonding systems and equipment, plus the following special applications:
- 2. Underground distribution grounding.
- 3. Ground bonding common with lightning protection system.
- 4. Foundation steel electrodes.
- 5. Overhead-line grounding.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Test wells.
 - 2. Ground rods.
 - 3. Ground rings.
 - 4. Grounding arrangements and connections for separately derived systems.
 - 5. Grounding for sensitive electronic equipment.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 01730 "Operation and Maintenance Data," include the following:
 - a. Plans showing as-built, dimensioned locations of system described in "Field Quality Control" Article, including the following:
 - 1) Test wells.
 - 2) Ground rods.
 - 3) Ground rings.
 - 4) Grounding arrangements and connections for separately derived systems.
 - 5) Grounding for sensitive electronic equipment.
 - b. Instructions for periodic testing and inspection of grounding features at test wells, ground rings, and grounding connections for separately derived systems based on NETA MTS NFPA 70B.
 - 1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
 - 2) Include recommended testing intervals.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Certified by NETA.
- B. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with UL 467 for grounding and bonding materials and equipment.
- D. ANSI/IEEE Standard 142 Recommended for Practice for Grounding of Industrial and Commercial Power Systems.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. ABB (Electrification Products Division).
 - 2. Appleton - O-Z/Gedney; Emerson Electric Co., Automation Solutions.
 - 3. Burndy; Hubbell Incorporated, Construction and Energy.
 - 4. ILSCO.
 - 5. Siemens Industry, Inc., Energy Management Division.

2.3 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B3.
 - 2. Stranded Conductors: ASTM B8.
 - 3. Tinned Conductors: ASTM B33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

- 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
- E. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
- F. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- G. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.
- H. Conduit Hubs: Mechanical type, terminal with threaded hub.
- I. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- J. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- K. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.
- L. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.

- M. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- N. Straps: Solid copper, [**cast-bronze clamp**] [**copper lugs**]. Rated for 600 A.
- O. Tower Ground Clamps: Mechanical type, copper or copper alloy, terminal [**one**] [**two**]-piece clamp.
- P. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- Q. Water Pipe Clamps:
 - 1. Mechanical type, two pieces with stainless-steel bolts.
 - a. Material: Die-cast zinc alloy.
 - b. Listed for direct burial.
 - 2. U-bolt type with malleable-iron clamp and copper ground connector rated for direct burial.

2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.
- B. Ground Plates: 1/4 inch (6 mm) thick, hot-dip galvanized.

PART 3 EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 30 inches below grade.
 - 2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.
- C. Grounding Conductors: Green-colored insulation with continuous yellow stripe.
- D. Isolated Grounding Conductors: Green-colored insulation with more than one continuous yellow stripe. On feeders with isolated ground, identify grounding conductor

where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

- E. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.
- F. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

- A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, non-shrink grout.

- C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.
- D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches from the foundation.

3.5 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.
 - 7. Armored and metal-clad cable runs.
 - 8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

- D. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- F. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- G. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.
- H. Separately Derived System Grounding: Bond the case and neutral of each transformer directly to the nearest available effectively grounded structural metal member of the structure, the nearest available effectively grounded metal water pipe, or in accordance with the local electrical inspection department. Flexible conduit shall not be used as a ground path to a transformer.
- I. Metallic Fences: Comply with requirements of IEEE C2.
 - 1. Grounding Conductor: Bare copper, not less than No. 8 AWG or as indicated on the drawings.
 - 2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
 - 3. Barbed Wire: Strands shall be bonded to the grounding conductor.

3.6 FENCE GROUNDING

- A. Fence Grounding: Install at maximum intervals of 1500 feet (450 m) or as indicated on the drawings except as follows:
 - 1. Fences within 100 Feet (30 m) of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet (225 m).

- a. Gates and Other Fence Openings: Ground fence on each side of opening.
 - 1) Bond metal gates to gate posts.
 - 2) Bond across openings, with and without gates, except at openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches (460 mm) below finished grade.
- B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet (45 m) on each side of crossing.
- C. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.
- D. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.
- E. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
- F. Bonding to Lightning-Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning-protection down conductor or lightning-protection grounding conductor, complying with NFPA 780.

3.7 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor and install in conduit.
- C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. Use exothermic welds for all below-grade connections.

3. For grounding electrode system, install at least two rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 16143 "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches deep, with cover.
1. Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- F. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- G. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.

- H. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.
- I. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.
 - 1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
 - 2. Bury ground ring not less than 24 inches from building's foundation.
- J. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; use a minimum of 20 feet of bare copper conductor not smaller than No. 4 AWG.
 - 1. If concrete foundation is less than 20 feet long, coil excess conductor within base of foundation.
 - 2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.
- K. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.8 LABELING

- A. Comply with requirements in Division 16 Section "Electrical Identification" Article for instruction signs. The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.

1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.9 FIELD QUALITY CONTROL

- A. Perform tests and inspections as specified in Section 16670 "Electrical Testing".

3.10 COORDINATION

- A. General: Coordinate installation of grounding connections for equipment with equipment installation work. Inspect grounding and bonding system conductors for tightness and proper installation.
- B. Connections: Use exothermic welds or irreversible compression products for connecting bonding and grounding conductors to ground rods, to counterpoise, structural steel, piping systems, and elsewhere where shown on Drawings. Provide all accessories required for a complete installation.

3.11 TESTING

- A. Perform tests and inspections as specified in Section 16670 "Electrical Testing".

END OF SECTION

SECTION 16133
RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes, enclosures, and cabinets.

B. Related Requirements:

1. Section 16012 "Electrical General" for area classifications.
2. Section 16143 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

- A. ARC: Aluminum rigid conduit.
- B. GRC: Galvanized rigid steel conduit.
- C. IMC: Intermediate metal conduit.
- D. EMT: Electrical metaling tubing.
- E. FMC: Flexible metal conduit.
- F. LFMC: Liquidtight flexible metal conduit.

- G. LFNC: Liquidtight flexible nonmetallic conduit.
- H. RNC: Rigid nonmetallic conduit.
- I. RMC: Rigid metal conduit.
- J. RTRC: Reinforce thermosetting resin conduit (fiberglass).

1.4 ACTION SUBMITTALS

- A. Product Data: For raceways, surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Contractor shall submit raceway layouts during the submittal process including, but not limited to, plans, elevations, sections, details, and attachments to other work.
 - 1. Custom enclosures and cabinets.
- C. For each area classification as defined in Section 16012 "Electrical General", submit a tabbed section for raceways and boxes to be used in each area classification.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
 - 1. Structural members in paths of conduit groups with common supports.
 - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Seismic Qualification Data: Certificates, for enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 - 4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.

- C. Source quality-control reports.

1.6 CONDUIT SCHEDULE

- A. Refer to conduit and wire schedule on plans for raceway sizing and routing descriptions.

1.7 QUALITY ASSURANCE

- A. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.
- B. Comply with NFPA 70.

PART 2 PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AFC Cable Systems; a part of Atkore International.
 - b. Allied Tube & Conduit; a part of Atkore International.
 - c. Anamet Electrical, Inc.
 - d. Electri-Flex Company.
 - e. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - f. Southwire Company.
 - g. Thomas & Betts Corporation; A Member of the ABB Group.
 - h. Wheatland Tube Company.
 - 2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 3. GRC: Comply with ANSI C80.1 and UL 6.
 - 4. ARC: Comply with ANSI C80.5 and UL 6A.

5. IMC: Comply with ANSI C80.6 and UL 1242.
 6. Coated Steel Conduit: PVC-coated GRC.
 - a. Comply with NEMA RN 1.
 - b. Coating Thickness: 0.040 inch, minimum.
 7. EMT: Comply with ANSI C80.3 and UL 797.
 8. FMC: Comply with UL 1; zinc-coated steel.
 9. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- B. Metal Fittings:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. Anamet Electrical, Inc.
 - c. Electri-Flex Company.
 - d. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - e. Southwire Company.
 - f. Thomas & Betts Corporation; A Member of the ABB Group.
 - g. Wheatland Tube Company.
 2. Comply with NEMA FB 1 and UL 514B.
 3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 4. Fittings, General: Listed and labeled for type of conduit, location, and use.
 5. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
 6. Fittings for EMT:
 - a. Material: Steel.

- b. Type: compression.
- 7. Expansion Fittings:
 - a. Hot dipped galvanized steel, complying with UL 514, rated for environmental conditions where installed.
 - b. Exposed Runs: Expansion fittings shall be of the weatherproof type and shall be provided with an external bonding jumper. The expansion fittings shall allow for 4 inches of longitudinal movement and shall be designed so that when completely assembled the end of each conduit entering the fitting is bushed. O.Z. GEDNEY Type EX or approved equal.
 - c. Embedded runs: Expansion fittings shall be of the watertight and concretetight type and shall be provided with an internal bonding jumper. The expansion material shall be neoprene and shall allow for 0.75 inches of movement in any direction. Fittings shall be O.Z. GEDNEY Type DX.
- 8. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- C. Joint Compound for IMC, GRC or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

- A. Nonmetallic Conduit:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AFC Cable Systems; a part of Atkore International.
 - b. Anamet Electrical, Inc.
 - c. Arnco Corporation.
 - d. CANTEX INC.
 - e. Condux International, Inc.
 - f. Electri-Flex Company.
 - g. Lamson & Sessions.

- h. RACO; Hubbell.
 - i. Thomas & Betts Corporation; A Member of the ABB Group.
 - 2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 3. Fiberglass (RTRC):
 - a. Comply with NEMA TC 14.
 - b. Comply with UL 2515 for aboveground raceways.
 - c. Comply with UL 2420 for belowground raceways.
 - 4. ENT: Comply with NEMA TC 13 and UL 1653.
 - 5. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
 - 6. LFNC: Comply with UL 1660.
 - 7. Rigid HDPE: Comply with UL 651A.
 - 8. Continuous HDPE: Comply with UL 651A.
 - 9. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D3485.
 - 10. RTRC: Comply with UL 2515A and NEMA TC 14.
- B. Nonmetallic Fittings:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allied Tube & Conduit; a part of Atkore International
 - b. Anamet Electrical, Inc.
 - c. CANTEX, INC.
 - d. Champion Fiberglass, Inc.
 - e. Electri-Flex Company.

- f. Kraloy.
 - g. RACO; Hubbell.
 - h. Thomas & Betts Corporation; A Member of the ABB Group.
- 2. Fittings, General: Listed and labeled for type of conduit, location, and use.
- 3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- 4. Fittings for LFNC: Comply with UL 514B.
- 5. Solvents and Adhesives: As recommended by conduit manufacturer.
- 6. Expansion Fittings:
 - a. PVC, complying with UL 651, rated for environmental conditions where installed.
 - b. Fittings shall be of two-piece rigid PVC construction with internal O-ring to prevent the entrance of water and provide watertight seal. Fittings shall provide a minimum of 4" of longitudinal expansion in straight runs.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. B-line, an Eaton business.
 - 2. Hoffman; a brand of nVent.
 - 3. Square D.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 12 unless otherwise indicated, and sized according to NFPA 70.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Hinged type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hoffman; a brand of nVent.

2. Lamson & Sessions.

B. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Fiberglass: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.

D. PVC: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.

E. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.

F. Solvents and Adhesives: As recommended by conduit manufacturer.

2.5 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Engineer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Hubbell Incorporated; Wiring Device-Kellems.

b. Panduit Corp.

- c. Wiremold / Legrand.
- C. Surface Nonmetallic Raceways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Engineer from manufacturer's standard colors. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hubbell Incorporated.
 - b. Panduit Corp.
 - c. Wiremold / Legrand.

2.6 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Crouse-Hinds, an Eaton business.
 - 2. EGS/Appleton Electric.
 - 3. Erickson Electrical Equipment Company.
 - 4. Hoffman; a brand of nVent.
 - 5. Hubbell Incorporated.
 - 6. RACO; Hubbell.
 - 7. Spring City Electrical Manufacturing Company.
 - 8. Thomas & Betts Corporation; A Member of the ABB Group.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.

- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- J. Gangable boxes are prohibited.
- K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 12 with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic.
 - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- L. Cabinets:
 - 1. NEMA 250, Type 12 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.
 - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- M. Fittings and boxes in hazardous places shall be:
 - 1. Rated for Class 1, Division 1 or 2 to match Area Classification and made from copper free aluminum.

2. Conduit fittings shall be rigid steel or PVC coated rigid steel. Seal fittings for hazardous areas shall be CROUSE HINDS EYE or EYSEF as required for proper fill.
 3. All metallic hardware (hinges, screws, bolts, etc.) shall be type 316 stainless steel.
- N. Fittings and Boxes in CORROSIVE AREAS:
1. Non-metallic or stainless steel for unclassified areas.
 2. PVC coated copper free aluminum for Class 1, Division 1 areas.
 3. Stainless steel or copper free aluminum for Class 1, Division 2 areas.
 4. All metallic hardware (hinges, screws, bolts, etc.) shall be type 316 stainless steel.

PART 3 EXECUTION

3.1 RACEWAY APPLICATION

- A. Raceways shall be applied as specified below for each respective area classification as defined in Section 16012 "Electrical General".
- B. Outdoor Areas:
1. Conduit entrances shall be threaded, and fittings shall have gasketed covers.
 2. Threaded fastening hardware and rods shall be stainless steel. Raceway supports such as channel, clamps and brackets shall be stainless steel.
 3. Exposed Conduit: GRC.
 4. Concealed Conduit, Aboveground: GRC.
 5. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
 - a. Sweeps and risers for transition of PVC from below grade to above grade shall be GRC wrapped with corrosion resistant tape or RTRC.
 6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 7. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R stainless steel unless otherwise indicated.
- C. Indoor Wet and/or Damp Areas:

1. Conduit entrances shall be threaded, and fittings shall have gasketed covers.
 2. Threaded fastening hardware and rods shall be stainless steel. Raceway supports such as channel, clamps and brackets shall be stainless steel.
 3. Boxes and Enclosures: NEMA 250, Type 4X, stainless steel.
 4. Device boxes shall be cast, copper free aluminum.
 5. Exposed, Not Subject to Physical Damage: GRC
 6. Exposed, Not Subject to Severe Physical Damage: GRC
 7. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
 - a. Areas below 6'0"
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 8. Concealed in Ceilings and Interior Walls and Partitions: EMT or RNC, Type EPC-40-PVC.
 9. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 10. Boxes and Enclosures: NEMA 250, Type 4X stainless steel.
- D. Corrosive Areas: Apply raceway products as specified below unless otherwise indicated.
1. Exposed Conduit: RNC, Type EPC-80-PVC.
 2. Concealed, Raceway: RNC, Type EPC-40-PVC.
 3. Raceway supports such as channel, clamps and brackets shall be stainless steel.
 4. Threaded fastening hardware and rods shall be stainless steel.
 5. Boxes and Enclosures: NEMA 250, Type 4X stainless steel or non-metallic unless otherwise indicated.
- E. Hazardous Areas:
1. Hazardous areas shall have electrical installations which conform to Class and Division as shown on the drawings or as defined by the NEC and NFPA 820.

2. Provide seal fittings per NEC requirements.
 3. Exposed Conduit: GRC
 4. Exposed Conduit in Corrosive and Hazardous Areas: PVC-coated rigid steel conduit.
 5. Boxes and Enclosures: Shall be determined by area requirements.
 6. Raceway Supports:
 - a. Threaded fastening hardware and rods shall be stainless steel. Raceway supports such as channel, clamps and brackets shall be stainless steel.
- F. General Purpose Areas:
1. Exposed Conduit: GRC or IMC.
 2. Conduit Concealed in Walls or Ceilings: For general purpose lighting and receptacle circuits, conduit may be EMT.
 3. Boxes and Enclosures: Exposed boxes shall be cast, copper free aluminum, type FS/FD. Concealed boxes may be NEMA 1. Boxes poured in concrete shall be cast.
- G. Minimum Raceway Size:
1. Aboveground: 3/4-inch trade size.
 2. Underground: 1-inch trade size.
- H. Raceway Fittings: Compatible with raceways and suitable for use in area classification and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

- I. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.
- J. Motor feeders sourced from VFC's not utilizing shielded power cable shall be rigid metal conduit.
- K. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- L. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with requirements in Section 16129 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.
- E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Conceal all general receptacle and lighting raceways within finished walls, ceilings and floors.
- G. Complete raceway installation before starting conductor installation.
- H. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- I. Install no more than the equivalent of three 90-degree bends in any conduit run. Support within 12 inches of changes in direction.
- J. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- K. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- L. Support conduit within 12 inches of enclosures to which attached.

M. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Engineer for each specific location.
5. Change from RNC, Type EPC-40-PVC to GRC before rising above floor.

N. Stub-Ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

O. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

P. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

Q. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

R. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch-trade size and insulated throat metal bushings on 1-1/2-inch-trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

S. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

T. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

- U. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- V. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- W. Surface Raceways:
 - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- X. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- Y. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Conduit extending from interior to exterior of building.
 - 4. Conduit extending into pressurized duct and equipment.
 - 5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 - 6. Where otherwise required by NFPA 70.
- Z. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- AA. Expansion-Joint Fittings:
 - 1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that

is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.

2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 - d. Attics: 135 deg F temperature change.
 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
 4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- BB. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- CC. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to bottom of box unless otherwise indicated.
- DD. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat

surface for a raintight connection between box and cover plate or supported equipment and box.

- EE. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.
- FF. Locate boxes so that cover or plate will not span different building finishes.
- GG. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- HH. Set metal floor boxes level and flush with finished floor surface.
- II. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- JJ. SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS
 - 1. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 16144 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.3 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07840 "Through Penetration Firestopping."

3.4 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

3.5 FIELD INSPECTION

- A. Prior to backfilling and encasing conduits installed underground or covering conduits concealed in walls and ceilings, all raceways shall be inspected by the Engineer. Engineer shall be contacted a minimum of one week in advance for field inspection of concealed raceway. No raceway shall be concealed or backfilled until inspected by the Engineer. Prior to the Engineer inspection, the conduits to be inspected shall bear some type of marking indicating what the conduit is, in relation to the conduit and wire schedule; the marking may be tape with writing or simply writing directly on the conduit. Marking the conduit is the Contractor's responsibility.

END OF SECTION

SECTION 16143
UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal conduits and fittings, including GRC and PVC-coated steel conduit.
 - 2. Rigid nonmetallic duct.
 - 3. Flexible nonmetallic duct.
 - 4. Duct accessories.
 - 5. Precast concrete vaults.
 - 6. Precast concrete handholes.
 - 7. Polymer concrete handholes and boxes with polymer concrete cover.
 - 8. Fiberglass handholes and boxes with polymer concrete cover.
 - 9. Fiberglass handholes and boxes.
 - 10. High-density plastic boxes.
 - 11. Precast manholes.
 - 12. Cast-in-place manholes.
 - 13. Utility structure accessories.

1.3 DEFINITIONS

- A. Direct Buried: Duct or a duct bank that is buried in the ground, without any additional casing materials such as concrete.

- B. Duct: A single duct or multiple ducts. Duct may be either installed singly or as component of a duct bank.
- C. Duct Bank:
 - 1. Two or more ducts installed in parallel, with or without additional casing materials.
 - 2. Multiple duct banks.
- D. GRC: Galvanized rigid (steel) conduit.
- E. RTRC: Reinforced thermosetting resin conduit.
- F. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include duct-bank materials, including spacers and miscellaneous components.
 - 2. Include duct, conduits, and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
 - 3. Include accessories for manholes, handholes, boxes and vaults.
 - 4. Include underground-line warning tape.
- B. Shop Drawings:
 - 1. Precast or Factory-Fabricated Underground Utility Structures:
 - a. Include plans, elevations, sections, details, attachments to other work, and accessories.
 - b. Include duct entry provisions, including locations and duct sizes.
 - c. Include reinforcement details.
 - d. Include frame and cover design and manhole chimneys.
 - e. Include ladder details.
 - f. Include grounding details.

- g. Include dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.

- h. Include joint details.

2. Factory-Fabricated Handholes and Boxes Other Than Precast Concrete:

- a. Include dimensioned plans, sections, and elevations, and fabrication and installation details.

- b. Include duct entry provisions, including locations and duct sizes.

- c. Include cover design.

- d. Include grounding details.

- e. Include dimensioned locations of cable rack inserts, and pulling-in and lifting irons.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: For duct and duct bank. Show duct profiles and coordination with other utilities and underground structures.

- 1. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.

- 2. Drawings shall be signed and sealed by a qualified professional engineer.

B. Qualification Data: For professional engineer and testing agency responsible for testing

C. Product Certificates: For concrete and steel used in precast concrete manholes, vaults and handholes, as required by ASTM C858.

D. Source quality-control reports.

E. Field quality-control reports.

1.6 MAINTENANCE MATERIALS SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

B. Furnish cable-support stanchions, arms, insulators, and associated fasteners in quantities equal to 5 percent of quantity of each item installed.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

1.8 FIELD CONDITIONS

- A. Ground Water: Assume ground-water level is 36 inches below ground surface unless a higher water table is noted on Drawings.

PART 2 PRODUCTS

2.1 METAL CONDUIT AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Allied Tube & Conduit; a part of Atkore International.
 - 2. Anamet Electrical, Inc.
 - 3. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 4. Southwire Company.
 - 5. Thomas & Betts Corporation; A Member of the ABB Group.
 - 6. Wheatland Tube Company.
- B. GRC: Comply with ANSI C80.1 and UL 6.
- C. Coated Steel Conduit: PVC-coated GRC.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch, minimum.
- D. Re-galvanizing Coatings: Galv-Weld as manufactured by Unibraz Corporation, Gal-Van-Ize as manufactured by LAWSON Products, Inc.
- E. Below Grade Sealants: BITUMASTIC or brush applied ROB-ROY coating. Spray on products shall not be allowed.
- F. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.

2.2 RIGID NONMETALLIC DUCT

- A. Underground Plastic Utilities Duct: Type EPC-40-PVC RNC, complying with NEMA TC 2 and UL 651, with matching fittings complying with NEMA TC 3 by same manufacturer as duct.
- B. Underground RTRC Duct: Comply with NEMA TC 14 and UL 2420 for underground raceways.
- C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. CANTEX INC.
 - 2. Carlon
 - 3. Champion Fiberglass, Inc.
 - 4. Cresline Plastic Pipe Co., Inc.
 - 5. Allied Tube & Conduit, a part of Atkore International.
- D. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
- E. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 FLEXIBLE NONMETALLIC DUCTS

- A. HDPE Duct: Type EPEC-40 HDPE, complying with NEMA TC 7 and UL 651A.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Carlon; a brand of Thomas & Betts Corporation.
 - b. Opti-Com Manufacturing Network, Inc (OMNI).
 - 2. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.

2.4 DUCT ACCESSORIES

- A. Duct Spacers: Factory-fabricated, rigid, PVC interlocking spacers; sized for type and size of duct with which used and selected to provide minimum duct spacing indicated while supporting duct during concreting or backfilling.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. CANTEX INC.
 - b. Carlon; a brand of Thomas & Betts Corporation.
 - c. IPEX USA LLC.
- B. Underground-Line Warning Tape: Comply with requirements for underground-line warning tape specified in Section 16153 "Identification for Electrical Systems."

2.5 PRECAST CONCRETE VAULTS

- A. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or box.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Oldcastle Infrastructure; a CRH company.
 - 2. Utility Concrete Products, LLC.
- C. Comply with ASTM C858 for design and manufacturing processes.
- D. Frame and Cover: Weatherproof steel frame, with hinged galvanized steel access door assembly with tamper-resistant, captive, cover-securing bolts, and spring-assisted opening mechanism.
 - 1. Cover Hinges: Concealed, with hold-open ratchet assembly.
 - 2. Cover Handle: Recessed.
 - 3. Springs: Stainless Steel, Type 316.
- E. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
- F. Cover Legend: Molded lettering, as indicated on the drawings.

- G. Configuration: Units shall be designed for flush burial and have integral closed bottom unless otherwise indicated.
- H. Extensions and Slabs: Designed to mate with bottom of enclosure. Same material as enclosure.
 - 1. Extension shall provide increased depth of 12 inches.
 - 2. Slab: Same dimensions as bottom of enclosure, and arranged to provide closure.
- I. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.
- J. Knockout Panels: Precast openings in walls, arranged to match dimensions and elevations of approaching duct, plus an additional 12 inches vertically and horizontally to accommodate alignment variations.
 - 1. Knockout panels shall be located no less than 6 inches from interior surfaces of walls, floors, or frames and covers of handholes, but close enough to corners to facilitate racking of cables on walls.
 - 2. Knockout panel opening shall have cast-in-place, welded-wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct.
 - 3. Knockout panels shall be framed with at least two additional No. 3 steel reinforcing bars in concrete around each opening.
 - 4. Knockout panels shall be 1-1/2 to 2 inches thick.
- K. Vaults shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.6 PRECAST CONCRETE HANDHOLES AND BOXES

- A. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or box.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Oldcastle Infrastructure; a CRH company.
 - 2. Utility Concrete Products, LLC.

- C. Comply with ASTM C858 for design and manufacturing processes.
- D. Frame and Cover: Weatherproof steel frame, with hinged galvanized steel access door assembly with tamper-resistant, captive, cover-securing bolts.
 - 1. Cover Hinges: Concealed, with hold-open ratchet assembly.
 - 2. Cover Handle: Recessed.
- E. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
- F. Cover Legend: Molded lettering, as indicated on the drawings.
- G. Configuration: Units shall be designed for flush burial and have open bottom unless otherwise indicated.
- H. Extensions and Slabs: Designed to mate with bottom of enclosure. Same material as enclosure.
 - 1. Extension shall provide increased depth of 12 inches.
 - 2. Slab: Same dimensions as bottom of enclosure, and arranged to provide closure.
- I. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.
- J. Handholes 12 inches wide by 24 inches long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.7 HANDHOLES AND BOXES

- A. Polymer Concrete Handholes: Molded of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two.
- B. Fiberglass Handholes: Sheet-molded, fiberglass-reinforced, polyester resin enclosure joined to polymer concrete top ring or frame.
- C. High Density Plastic Handholes: Injection molded of HDPE or copolymer-polypropylene. Cover shall be made of polymer concrete.
- D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armorcast Products Company.
 - 2. MacLean Highline.

3. NewBasis.
 4. Oldcastle Infrastructure; a CRH company.
 5. Quazite: Hubbell Power Systems, Inc.
- E. Standard: Comply with SCTE 77. Comply with tier requirements in "Underground Enclosure Application" Article.
 - F. Configuration: Units shall be designed for flush burial and have open bottom unless otherwise indicated.
 - G. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 - H. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - I. Cover Legend: Molded lettering, as indicated on the drawings.
 - J. Direct-Buried Wiring Entrance Provisions: Knockouts equipped with insulated bushings or end-bell fittings, selected to suit box material, sized for wiring indicated, and arranged for secure, fixed installation in enclosure wall.
 - K. Duct Entrance Provisions: Duct-terminating fittings shall mate with entering duct for secure, fixed installation in enclosure wall.
 - L. Handholes shall have factory-installed inserts for cable racks and pulling-in irons.

2.8 PRECAST MANHOLES

- A. Description: One-piece units and units with interlocking mating sections, complete with accessories, hardware, and features.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Oldcastle Precast, Inc.
 2. Utility Concrete Products, LLC.
- C. Comply with ASTM C858.
- D. Structural Design Loading: Comply with requirements in "Underground Enclosure Application" Article.

- E. Knockout Panels: Precast openings in walls, arranged to match dimensions and elevations of approaching duct, plus an additional 12 inches (300 mm) vertically and horizontally to accommodate alignment variations.
 - 1. Knockout panels shall be located no less than 6 inches (150 mm) from interior surfaces of walls, floors, or roofs of manholes, but close enough to corners to facilitate racking of cables on walls.
 - 2. Knockout panel opening shall have cast-in-place, welded-wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct.
 - 3. Knockout panel shall be framed with at least two additional No. 3 steel reinforcing bars in concrete around each opening.
 - 4. Knockout panels shall be 1-1/2 to 2 inches (38 to 50 mm) thick.
- F. Ground Rod Sleeve: Provide a 3-inch PVC sleeve in manhole floors 2 inches from the wall adjacent to, but not underneath, the duct entering the structure.
- G. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.

2.9 UTILITY STRUCTURE ACCESSORIES

- A. Accessories for Utility Structures: Utility equipment and accessory items used for utility structure access and utility support, listed and labeled for intended use and application.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Neenah Foundry Company.
 - 2. Utility Concrete Products, LLC.
- C. Manhole Frames, Covers, and Chimney Components: Comply with structural design loading specified for manhole.
 - 1. Frame and Cover: Weatherproof, gray cast iron complying with ASTM A48/A48M, Class 35B with milled cover-to-frame bearing surfaces; diameter, 29 inches.
 - a. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

- b. Special Covers: Recess in face of cover designed to accept finish material in paved areas.
- 2. Cover Legend: Cast in. Selected to suit system.
 - a. Legend: "ELECTRIC-LV" for duct systems with power wires and cables for systems operating at 600 V and less.
 - b. Legend: "ELECTRIC-HV" for duct systems with medium-voltage cables.
- 3. Manhole Chimney Components: Precast concrete rings with dimensions matched to those of roof opening.
 - a. Seal joints watertight using preformed plastic or rubber complying with ASTM C990. Install sealing material according to sealant manufacturers' written instructions.
- D. Manhole Sump Frame and Grate: ASTM A48/A48M, Class 30B, gray cast iron.
- E. Pulling Eyes in Concrete Walls: Eyebolt with reinforcing-bar fastening insert, 2-inch-diameter eye, and 1-by-4-inch bolt.
 - 1. Working Load Embedded in 6-Inch, 4000-psi Concrete: 13,000-lbf minimum tension.
- F. Pulling-in and Lifting Irons in Concrete Floors: 7/8-inch-diameter, hot-dip galvanized, bent steel rod; stress relieved after forming; and fastened to reinforcing rod. Exposed triangular opening.
 - 1. Ultimate Yield Strength: 40,000-lbf shear and 60,000-lbf tension.
- G. Bolting Inserts for Concrete Utility Structure Cable Racks and Other Attachments: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; 1/2-inch ID by 2-3/4 inches deep, flared to 1-1/4 inches minimum at base.
 - 1. Tested Ultimate Pullout Strength: 12,000 lbf minimum.
- H. Ground Rod Sleeve: 3-inch PVC sleeve in manhole floors 2 inches from the wall adjacent to, but not underneath, the ducts routed from the facility.
- I. Expansion Anchors for Installation after Concrete Is Cast: Zinc-plated, carbon-steel-wedge type with stainless-steel expander clip with 1/2-inch bolt, 5300-lbf rated pullout strength, and minimum 6800-lbf rated shear strength.
- J. Cable Rack Assembly: Steel, hot-dip galvanized, except insulators.

**SECTION 16143 – 11 UNDERGROUND DUCTS AND
RACEWAYS FOR ELECTRICAL SYSTEMS**

1. Stanchions: T-section or channel with provisions to connect to other sections or channels to form a continuous unit; 1-1/2 inches in width by nominal 24 inches long; punched with 14 hook holes on 1-1/2-inch centers for cable-arm attachment.
 2. Arms: 1-1/2 inches wide, lengths ranging from 3 inches with 450-lb minimum capacity to 18 inches with 250-lb minimum capacity. Arms shall have slots along full length for cable ties and be arranged for secure mounting in horizontal position at any vertical location on stanchions.
 3. Insulators: High-glaze, wet-process porcelain arranged for mounting on cable arms.
- K. Cable Rack Assembly: Nonmetallic. Components fabricated from nonconductive, fiberglass-reinforced polymer.
1. Stanchions: Nominal 36 inches high by 4 inches wide, with provisions to connect to other sections to form a continuous unit, with minimum of nine holes for arm attachment.
 2. Arms: Arranged for secure, drop-in attachment in horizontal position at any location on cable stanchions, and capable of being locked in position. Arms shall be available in lengths ranging from 3 inches with 450-lb minimum capacity to 20 inches with 250-lb minimum capacity. Top of arm shall be nominally 4 inches wide, and arm shall have slots along full length for cable ties.
- L. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F. Capable of withstanding temperature of 300 deg F without slump and adhering to clean surfaces of plastic ducts, metallic conduit, conduit and duct coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.
- M. Fixed Manhole Ladders: Arranged for attachment to wall and floor of manhole. Ladder and mounting brackets and braces shall be fabricated from hot-dip galvanized steel.
- N. Portable Manhole Ladders: UL-listed, heavy-duty fiberglass specifically designed for portable use for access to electrical manholes. Minimum length equal to distance from deepest manhole floor to grade plus 36 inches. One required.
- O. Cover Hooks: Heavy duty, designed for lifts 60 lbf and greater. Two required.
- 2.10 SOURCE QUALITY CONTROL
- A. Test and inspect precast concrete utility structures according to ASTM C1037.

- B. Nonconcrete Handhole and Pull-Box Prototype Test: Test prototypes of manholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
 - 1. Tests of materials shall be performed by an independent testing agency.
 - 2. Strength tests of complete boxes and covers shall be by an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
 - 3. Testing machine pressure gages shall have current calibration certification, complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 EXECUTION

3.1 PREPARATION

- A. Coordinate layout and installation of duct, duct bank, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Notify Engineer if there is a conflict between areas of excavation and existing structures or archaeological sites to remain.
- B. Coordinate elevations of duct and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of duct and duct banks, as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations as required to suit field conditions and to ensure that duct and duct bank will drain to manholes and handholes, and as approved by the Engineer.
- C. Clear and grub vegetation to be removed, and protect vegetation to remain according to Section 02230 "Site Clearing." Remove and stockpile topsoil for reapplication according to Section 02230 "Site Clearing."

3.2 UNDERGROUND DUCT APPLICATION

- A. Duct for Electrical Cables More Than 600 V: Type EPC-40-PVC RNC, concrete-encased unless otherwise indicated.
- B. Duct for Electrical Feeders 600 V and Less: Type EPC-40-PVC RNC, concrete-encased unless otherwise indicated.
- C. Duct for Electrical Branch Circuits: Type EPC-40-PVC RNC, direct-buried unless otherwise indicated.
- D. Bored Underground Duct: Type EPEC-40-HDPE unless otherwise indicated.
- E. Underground Ducts Crossing paved paths, walkways, driveways, roadways and railroads: Type EPC-40 PVC RNC, encased in reinforced concrete.

- F. Stub-ups: GRC or RTRC.

3.3 UNDERGROUND ENCLOSURE APPLICATION

A. Handholes and Boxes for 600 V and Less:

1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete. AASHTO HB 17, H-20 structural load rating.
2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15 structural load rating.
3. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Precast concrete, AASHTO HB 17, H-10 structural load rating.
4. Units Subject to Light-Duty Pedestrian Traffic Only: High-density plastic, structurally tested according to SCTE 77 with 3000-lbf vertical loading.
5. Cover design load shall not exceed the design load of the handhole or box.

B. Manholes: Precast concrete.

1. Units Located in Roadways and Other Deliberate Traffic Paths by Heavy or Medium Vehicles: H-20 structural load rating according to AASHTO HB 17.
2. Units Not Located in Deliberate Traffic Paths by Heavy or Medium Vehicles: H-10 load rating according to AASHTO HB 17.

3.4 EARTHWORK

A. Excavation and Backfill: Comply with Section 02324 "Backfill and Compacting for Utilities," but do not use heavy-duty, hydraulic-operated, compaction equipment.

1. Excavated material shall be examined to be acceptable for backfill by the Engineer. If deemed not acceptable, then borrow material which possesses a 1/2-inch screen shall be used. Six inches of backfill shall be required above and below conduit or direct buried cable installation.

B. Restoration: Replace area after construction vehicle traffic in immediate area is complete.

C. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

- D. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Section 02910 "Planting".

3.5 DUCT AND DUCT BANK INSTALLATION

- A. Where indicated on Drawings, install duct, spacers, and accessories into the duct-bank configuration shown. Duct installation requirements in this Section also apply to duct bank.
- B. Install duct according to NEMA TCB 2.
- C. Slope: Pitch duct a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope duct from a high point between two manholes, to drain in both directions.
- D. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches, both horizontally and vertically, at other locations unless otherwise indicated.
 - 1. Duct shall have maximum of two 90-degree bends or the total of all bends shall be no more than 180 degrees between pull points.
- E. Joints: Use solvent-cemented joints in duct and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent duct do not lie in same plane.
- F. Installation Adjacent to High-Temperature Steam Lines: Where duct is installed parallel to underground steam lines, perform calculations showing the duct will not be subject to environmental temperatures above 40 deg C. Where environmental temperatures are calculated to rise above 40 deg C, and anywhere the duct crosses above an underground steam line, install insulation blankets listed for direct burial to isolate the duct bank from the steam line.
- G. Terminator Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use manufactured, cast-in-place duct terminators, with entrances into structure spaced approximately 6 inches o.c. for 4-inch duct, and vary proportionately for other duct sizes.
 - 1. Begin change from regular spacing to terminator spacing 10 feet from the terminator, without reducing duct line slope and without forming a trap in the line.
 - 2. Expansion and Deflection Fittings: Install an expansion and deflection fitting in each duct in the area of disturbed earth adjacent to manhole or handhole. Install an expansion fitting near the center of all straight-line duct with calculated expansion of more than 3/4-inch.

- H. Building Wall Penetrations: Make a transition from underground duct to GRC at least 10 feet outside the building wall, without reducing duct line slope away from the building and without forming a trap in the line. Use fittings manufactured for RNC-to-GRC transition. Install GRC penetrations of building walls as specified in Section 16144 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
- I. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.
- J. Pulling Cord: Install 200-lbf-test nylon cord in empty ducts. Leave at least 12 inches of slack at each end of pull cord.
- K. Separation from Other Utilities: Underground electrical conduit shall be kept 3'-0" horizontally and 1'-0" vertically at crossings from other underground utilities except telephone.
- L. Concrete-Encased Ducts and Duct Bank:
 - 1. Excavate trench bottom to provide firm and uniform support for duct. Prepare trench bottoms as specified in Section 02324 "Backfilling and Compacting for Utilities" for pipes less than 6 inches in nominal diameter.
 - 2. Width: Excavate trench 12 inches wider than duct on each side.
 - 3. Width: Excavate trench 3 inches wider than duct on each side.
 - 4. Depth: Install so top of duct envelope is at least 24 inches below finished grade in areas not subject to deliberate traffic, and at least 30 inches below finished grade in deliberate traffic paths for vehicles unless otherwise indicated.
 - 5. Support duct on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
 - 6. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than five spacers per 20 feet of duct. Place spacers within 24 inches of duct ends. Stagger spacers approximately 6 inches between tiers. Secure spacers to earth and to duct to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
 - 7. Minimum Space between Duct: 3 inches between edge of duct and exterior envelope wall, 2 inches between ducts for like services, and 4 inches between power and communications ducts.

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8. Minimum Space Between Duct: Underground electrical power feeders shall be separated by a minimum of 7-1/2 inch spacing on center. Control and instrumentation conduits shall maintain a minimum of 2 inches of separation between conduit walls.
9. Elbows: Use manufactured GRC or RTRC elbows for stub-ups, at building entrances, and at changes of direction in duct run.
 - a. Couple RNC duct to GRC or RTRC with adapters or solvents designed for this purpose, and encase coupling with 3 inches of concrete.
 - b. Stub-ups to Outdoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches from edge of base. Install insulated grounding bushings on terminations at equipment.
 - 1) Stub-ups shall be minimum 4 inches above finished floor and minimum 3 inches from conduit side to edge of slab.
 - c. Stub-ups to Indoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches from edge of wall. Install insulated grounding bushings on terminations at equipment.
 - 1) Stub-ups shall be minimum 4 inches above finished floor and no less than 3 inches from conduit side to edge of slab.
10. Reinforcement: Reinforce concrete-encased duct where crossing disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.
11. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
12. Concrete Cover: Install a minimum of 3 inches of concrete cover between edge of duct to exterior envelope wall, 2 inches between duct of like services, and 4 inches between power and communications ducts.
13. Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.
 - a. Start at one end and finish at the other, allowing for expansion and contraction of duct as its temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written instructions, or use other specific measures to prevent expansion-contraction damage.

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- b. If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch reinforcing-rod dowels extending a minimum of 18 inches into concrete on both sides of joint near corners of envelope.

- 14. Pouring Concrete: Comply with requirements in "Concrete Placement" Article in Section 03300 "Cast-in-Place Concrete." Place concrete carefully during pours to prevent voids under and between duct and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Allow concrete to flow around duct and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-installation application.

M. Direct-Buried Duct and Duct Bank:

- 1. Excavate trench bottom to provide firm and uniform support for duct. Comply with requirements in Section 02324 "Backfilling and Compacting for Utilities" for preparation of trench bottoms for pipes less than 6 inches in nominal diameter.
- 2. Width: Excavate trench 12 inches wider than duct on each side.
- 3. Depth: Install top of duct at least 24 inches below finished grade unless otherwise indicated.
- 4. Set elevation of bottom of duct bank below frost line.
- 5. Support ducts on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
- 6. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than five spacers per 20 feet of duct. Place spacers within 24 inches of duct ends. Stagger spacers approximately 6 inches between tiers. Secure spacers to earth and to ducts to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
- 7. Minimum Spacing Between Ducts: Underground electrical power feeders shall be separated by a minimum of 7-1/2 inch spacing on center. Control and instrumentation conduits shall maintain a minimum of 2 inches of separation between conduit walls.
- 8. Stub-ups: Install manufactured GRC or RTRC elbows for stub-ups, at building entrances, and at changes of direction in duct.
 - a. Couple RNC duct to GRC with adapters designed for this purpose and encase coupling with 3 inches of concrete.

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- b. Stub-ups to Outdoor Equipment on Concrete Bases: Extend concrete-encased GRC horizontally a minimum of 60 inches from edge of base. Install insulated grounding bushings on terminations at equipment.
 - 1) Stub-ups shall be minimum 4 inches above finished floor and minimum 3 inches from conduit side to edge of slab.
 - c. Stub-ups to Indoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches from edge of wall. Install insulated grounding bushings on terminations at equipment.
 - 1) Stub-ups shall be minimum 4 inches above finished floor and no less than 3 inches from conduit side to edge of slab.
 - 9. After installing first tier of duct, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inches over duct and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction. Comply with requirements in Section 02324 "Backfilling and Compacting for Utilities" for installation of backfill materials.
 - a. Place minimum 6 inches of sand as a bed for duct. Place sand to a minimum of 6 inches above top level of duct.
 - N. Underground-Line Warning Tape: Bury detectable underground line specified in Section 16153 "Identification for Electrical Systems" no less than 12 inches above all concrete-encased duct and duct banks and approximately 12 inches below grade. Align tape parallel to and within 3 inches of centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct-bank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally. A separate detectable warning tape is to be installed directly above PVC conduits which have been installed as spares, for future location of the conduit.

3.6 INSTALLATION OF CONCRETE MANHOLES, HANDHOLES, AND BOXES

- A. Cast-in-Place Manhole Installation:
 - 1. Finish interior surfaces with a smooth-troweled finish.
 - 2. Knockouts for Future Duct Connections: Form and pour concrete knockout panels 1-1/2 to 2 inches thick, arranged as indicated.
 - 3. Comply with requirements in Section 03300 "Cast-in-Place Concrete" for cast-in-place concrete, formwork, and reinforcement.

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- B. Precast Concrete Handhole and Manhole Installation:
1. Comply with ASTM C891 unless otherwise indicated.
 2. Install units level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances.
 3. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevations:
1. Manhole Roof: Install with rooftop at least 15 inches below finished grade.
 2. Manhole Frame: In paved areas and trafficways, set frames flush with finished grade. Set other manhole frames 1 inch above finished grade.
 3. Install handholes with bottom below the frost line.
 4. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch above finished grade.
 5. Where indicated, cast handhole cover frame integrally with handhole structure.
- D. Drainage: Install drains in bottom of manholes where indicated. Coordinate with drainage provisions indicated.
- E. Manhole Access: Circular opening in manhole roof; sized to match cover size.
1. Manholes with Fixed Ladders: Offset access opening from manhole centerlines to align with ladder.
 2. Install chimney, constructed of precast concrete collars and rings, to support cast-iron frame to connect cover with manhole roof opening. Provide moisture-tight masonry joints and waterproof grouting for frame to chimney.
- F. Waterproofing: Apply waterproofing to exterior surfaces of manholes after concrete has cured at least three days. After duct has been connected and grouted, and before backfilling, waterproof joints and connections, and touch up abrasions and scars. Waterproof exterior of manhole chimneys after mortar has cured at least three days.
- G. Dampproofing: Apply dampproofing to exterior surfaces of manholes after concrete has cured at least three days. Dampproofing materials and installation are specified in Section 071113 "Bituminous Dampproofing." After ducts are connected and grouted, and before backfilling, dampproof joints and connections, and touch up abrasions and

scars. Dampproof exterior of manhole chimneys after mortar has cured at least three days.

- H. Hardware: Install removable hardware, including pulling eyes, cable stanchions, and cable arms, and insulators, as required for installation and support of cables and conductors and as indicated.
- I. Fixed Manhole Ladders: Arrange to provide for safe entry with maximum clearance from cables and other items in manholes.
- J. Field-Installed Bolting Anchors in Manholes and Concrete Handholes: Do not drill deeper than 3-7/8 inches for manholes and 2 inches for handholes, for anchor bolts installed in the field. Use a minimum of two anchors for each cable stanchion.

3.7 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of duct, and seal joint between box and extension as recommended by manufacturer.
 - B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
 - C. Elevation: In paved areas and trafficways, set cover flush with finished grade. Set covers of other handholes 1 inch above finished grade.
 - D. Install handholes and boxes with bottom below frost line.
 - E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.
 - F. Field cut openings for duct according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.
 - G. For enclosures installed in asphalt paving and subject to occasional, nondeliberate, heavy-vehicle loading, form and pour a concrete ring encircling, and in contact with, enclosure and with top surface screeded to top of box cover frame. Bottom of ring shall rest on compacted earth.
- 1. Concrete: 3000 psi (20 kPa), 28-day strength, complying with Section 03300 "Cast-in-Place Concrete," with a troweled finish.

2. Dimensions: 10 inches wide by 12 inches deep (250 mm wide by 300 mm deep).

3.8 GROUNDING

- A. Ground underground ducts and utility structures according to Section 16126 "Grounding and Bonding for Electrical Systems."

3.9 FIELD QUALITY CONTROL

- A. Perform tests and inspection as specified in Section 16670 "Electrical Testing".

3.10 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of duct until duct cleaner indicates that duct is clear of dirt and debris. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump.
 1. Sweep floor, removing dirt and debris.
 2. Remove foreign material.

END OF SECTION

SECTION 16153
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Color and legend requirements for raceways, conductors, and warning labels and signs.
 - 2. Labels.
 - 3. Bands and tubes.
 - 4. Tapes and stencils.
 - 5. Tags.
 - 6. Signs.
 - 7. Cable ties.
 - 8. Paint for identification.
 - 9. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.
- B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system

components used in identification signs and labels. Use same designations indicated on Drawings.

- D. Delegated-Design Submittal: For arc-flash hazard study.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Comply with NFPA 70E and Section 16677 "Arc-Flash Hazard Analysis" requirements for arc-flash warning labels.
- F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
 - 1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
 - 2. Insulation on phase conductor sizes AWG No. 10 and smaller shall be colored, No. 8 AWG and larger may have black insulation with self-adhesive vinyl tape of the appropriate color from the table below.

3. Insulation on the grounded conductor (neutral) sizes AWG No. 8 and smaller shall be colored, AWG No. 6 and larger may have black insulation with self-adhesive vinyl tape of white or gray in accordance with the table below.
- C. Color-Coding for Power and Control Conductors, 600V or Less: Wiring shall conform to the following color code. Colors specified in table below are those generally used for phase conductors at this voltage.

Description	208/120	120/240	480/277	Control
Phase A (Left)	Black	Black	Brown	--
Phase B (Center)	Red	Red	Orange	--
Phase C (Right)	Blue	Blue	Yellow	--
Neutral	White	White	Gray	White
Ground	Green	Green	Green	Green
120V Control	--	--	--	Red
DC Control (+)	--	--	--	Blue
DC Control (-)	--	--	--	Gray
External Source	--	--	--	Orange

- D. Raceways and Cables Carrying Circuits at More Than 600 V:
1. Black letters on an orange field.
 2. Legend: "DANGER - CONCEALED HIGH VOLTAGE WIRING."
- E. Warning Label Colors:
1. Identify system voltage with black letters on an orange background.
 2. Black letters on an orange background with black letters on a white background for the message panel.

F. Warning labels and signs shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES"

G. Equipment Identification Labels:

1. White letters on a black field.

2.3 LABELS

A. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil-thick, multicolor, weather, chemical and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Brady Corporation.
 - b. Graphic Products.
2. Minimum Nominal Size:
 - a. 3-1/2 by 5 inches for equipment.
 - b. 4 by 6 inches for arc flash labels.
 - c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

A. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Brady Corporation.
 - b. Panduit Corp.

- c. Thomas & Betts.
 - d. HellermannTyton.
- B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Brady Corporation.
 - b. Carlton Industries, LP.
 - c. emedco.
 - d. Marking Services, Inc.
- C. Floor Marking Tape: 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Carlton Industries, LP.
 - b. Seton Identification Products.
 - c. Brady Corporation.
- D. Underground-Line Warning Tape:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Brady Corporation.
 - b. Marking Services, Inc.
 - c. Seton Identification Products.
 - 2. Tape:

- a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - b. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
3. Color and Printing:
- a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
 - b. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
 - c. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.
4. Tag:
- a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - b. Width: 3 inches.
 - c. Overall Thickness: 5 mils.
 - d. Foil Core Thickness: 0.35 mil.
 - e. Weight: 28 lb/1000 sq. ft.
 - f. Tensile according to ASTM D882: 70 lbf and 4600 psi.

2.5 TAGS

- A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. Brady Corporation.
- b. Carlton Industries, LP.
- c. Seton Identification Products.

2.6 SIGNS

A. Baked-Enamel Signs:

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Carlton Industries, LP.
 - b. Champion America.
 - c. emedco.
 - d. Marking Services, Inc.
- 2. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
- 3. 1/4-inch grommets in corners for mounting.
- 4. Nominal Size: 7 by 10 inches.

B. Metal-Backed Butyrate Signs:

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Brady Corporation.
 - b. Champion America.
 - c. Marking Services, Inc.
- 2. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
- 3. 1/4-inch grommets in corners for mounting.

4. Nominal Size: 10 by 14 inches.
- C. Laminated Acrylic or Melamine Plastic Signs:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Brady Corporation.
 - b. Carlton Industries, LP.
 - c. Marking Services, Inc.
 2. Engraved legend.
 3. Thickness:
 - a. For signs up to 20 sq. in., minimum 1/16 inch thick.
 - b. For signs larger than 20 sq. in., 1/8 inch thick.
 - c. Engraved legend with black letters on white face.
 - d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.
 - e. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.
 - f. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.7 CABLE TIES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. HellermannTyton.
 2. Panduit Corp.
- B. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
 2. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.
 3. Temperature Range: Minus 40 to plus 185 deg F.
 4. Color: Black, except where used for color-coding.
- C. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
1. Minimum Width: 3/16 inch.
 2. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.
 3. Temperature Range: Minus 40 to plus 185 deg F.
 4. Color: Black.
- D. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
1. Minimum Width: 3/16 inch.
 2. Tensile Strength at 73 Deg F according to ASTM D638: 7000 psi.
 3. UL 94 Flame Rating: 94V-0.
 4. Temperature Range: Minus 50 to plus 284 deg F.
 5. Color: Black.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 EXECUTION

3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

- B. Heat Shrink Identification Products: Before applying products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, operation and maintenance manual, 29 CFR 1910.145, and with those required by applicable codes and standards. Use consistent designations throughout Project.
- ~~B.~~ Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Coordinate installation of identifying devices with location of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.
- D. Verify identity of each item before installing identification products.
- E. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- F. Apply identification devices to surfaces that require finish after completing finish work.
- G. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- I. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.
- K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- L. Painting Identification: Comply with requirements in Painting Sections for surface preparation and paint application.

- M. Aluminum ID tags shall not be used in rooms where chlorine, or like substance, is present.
- N. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.
- O. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
- P. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in enclosures where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- Q. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.
- R. Underground Line Warning Tape:
 - 1. During backfilling of trenches, install continuous underground line warning tape for power, lighting, communication, control wiring and optical fiber cable as specified in Section 16143 "Underground Ducts and Raceways for Electrical Systems".
- S. Metal Tags:
 - 1. Place in a location with high visibility and accessibility.
 - 2. Secure using cable ties appropriate for the location.
- T. Baked-Enamel Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on minimum 1-1/2-inch-high sign; where two lines of text are required, use signs minimum 2 inches high.
- U. Laminated Acrylic or Melamine Plastic Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

V. Cable Ties: General purpose for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

- A. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- B. All wiring in industrial machines and equipment shall be in accordance with NFPA 79. Notify Owner of any deficiencies noted during installation.
- C. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil. Stencil legend "DANGER - CONCEALED HIGH-VOLTAGE WIRING" with 3-inch-high, black letters on 20-inch centers.
- D. Locate identification at changes in direction, at penetrations of walls and floors, and at 30-foot maximum intervals.
- E. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Identify with metal tags.
 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
 2. Provide tags for all raceways identified in conduit and wire schedules.
 3. Locate identification at each end of raceway and at penetrations of walls, floors, enclosures, vaults and handholes.
- F. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits: Identify with metal tags.
 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
 2. Provide tags for all raceways identified in conduit and wire schedules.
 3. Locate identification at each end of raceway and at penetrations of walls, floors, enclosures, vaults and handholes.

- G. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
1. "EMERGENCY POWER."
 2. "POWER."
 3. "UPS."
- H. Power-Circuit and Control Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive vinyl tape to identify the phase in conformance with the color-coding legend requirements of Part 2.
1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
 2. All control wiring in control panels or other enclosures that is powered from an external source and is not disconnected by the control panel disconnect shall be terminated at a disconnecting terminal block upon entering the enclosure. The color of the wire shall then be changed to yellow to identify it as being powered from an external source. Provide identification nameplate on the exterior of the enclosure to indicate sources of external power.
- I. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic preprinted tags colored and marked to indicate phase, and a separate tag with the circuit designation.
- J. Wire Marking:
1. All power and control conductors (including conductors in instrument and relay compartments of motor control centers, control panels, instrument panels, field panels and control stations, as well as connections to mechanical equipment), shall be tagged at each end with legible, pre-printed heat-shrink tubes showing the complete wire designation.
 2. Wire marking lettering shall be bold and type written.
 3. Wiring within a single enclosure shall be marked with the basic wire and terminal number at each end.
 4. All field wiring for controls shall have wire labels at each end. The labels shall be marked with the output terminal number at the source ~~original~~ equipment (control panel, MCP or MCC), the remote device terminal number (if applicable) and tag name separated by a slash.

5. Examples:
- a. A control cable from the Main Control Panel (MCP) terminal #X102 to the pump 101 check valve limit switch (ZS-101) the wire tag number at both ends shall be X102 / ZS-101.
 - b. A control cable from the MCP to a local control panel terminal #Y102, to terminal #24 in LCP-200, the wire tag number at both ends shall be Y102 / 24-LCP200
 - c. A control cable from the MCP terminal #H32 to the NMCC1 terminal #6, the tag number at both ends shall be H32 / 6-NMCC1.
 - d. A control cable from the NMCC1 terminal #C4 to device ZS-101, the wire tag number at both ends shall be C4-NMCC1 / ZS-101.
6. Spare wiring shall be identified at each end with "SP#" and remote equipment number.
- a. Example: For two spare control cables from the Main Control Panel (MCP) terminal to the local control panel (LCP-202), the wire tag number at the LCP shall be SP1 / MCP and SP2 / MCP. The tag number at the MCP shall be SP1 / LCP202 and SP2 / LCP202.
- K. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- L. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, control wiring and optical-fiber cable. Install as directed in section 16143 "Underground Ducts and Raceways for Electrical Systems"
- M. Concealed Raceways and Duct Banks, More Than 600 V, within Buildings: Apply floor marking tape to the following finished surfaces:
- 1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
 - 2. Wall surfaces directly external to raceways concealed within wall.
 - 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- N. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

- O. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- P. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.
 - 1. Apply to exterior of door, cover, or other access.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
 - a. Power-transfer switches.
 - b. Controls with external control power connections.
- Q. Arc Flash Warning Labeling: Self-adhesive labels.
- R. Operating Instruction Signs: Baked-enamel warning signs
- S. Emergency Operating Instruction Signs: Baked-enamel warning signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.
- T. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets and racks of each systems. Systems include power, lighting, control communications, signal, monitoring and alarm systems unless equipment is provided with its own identification.
 - 1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
 - 2. Outdoor Equipment: Laminated acrylic or melamine plastic sign.
 - 3. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 - 4. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of an engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.

- c. Access doors and panels for concealed electrical items.
- d. Switchgear.
- e. Switchboards.
- f. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- g. Emergency system boxes and enclosures.
- h. Motor-control centers.
- i. Enclosed switches.
- j. Enclosed circuit breakers.
- k. Enclosed controllers.
- l. Manual motor controllers.
- m. Magnetic motor controllers.
- n. Soft-start motor controllers.
- o. Variable-speed controllers.
- p. Push-button stations.
- q. Power-transfer equipment.
- r. Contactors.
- s. Remote-controlled switches, dimmer modules, and control devices.
- t. Battery-inverter units.
- u. Battery racks.
- v. Power-generating units.
- w. Monitoring and control equipment.
- x. UPS equipment.

END OF SECTION

SECTION 16153 – 16

**IDENTIFICATION FOR
ELECTRICAL SYSTEMS**

SECTION 16155 MOTORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section covers motors which are supplied with and as part of connected equipment specified in other sections of this specification.
- B. Related Sections include the following:
 - 1. Division 15000
 - 2. Division 13000
 - 3. Division 11000

1.3 STANDARDS AND CODES

- A. All materials and equipment specified herein shall be within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.
- B. All materials and equipment specified herein shall conform with all applicable NEMA, ANSI and IEEE Standards
- C. All materials and equipment specified here-in and their installation methods shall conform to the latest published version of the National Electrical Code, NEC

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated including complete name-plate and efficiency information. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for Insert product. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

- C. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
- D. Wiring and Connection Diagrams: For all provided external connections including power, over-temp contacts, space heaters, moisture sensors.
- E. For motors with special requirements for protection such as over-temp, moisture, over-torque, etc. from electrical controls or components, submit detailed information on equipment, installation, and control wiring requirements.
- F. Motor terminal connection box size.

1.5 INFORMATIONAL SUBMITTALS

- A. Submit the motor manufacturer's certification of conformance to the specified bearing life on all motors 20 horsepower and larger. Also submit, upon the Engineer's request, certification of bearing life on smaller motors.
- B. For motors provided with cords, provide complete information on the cord including:
- C. Length, number and size of conductors, overall diameter, materials, ratings, etc.
- D. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For motors to include in emergency, operation and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace motor or components that fail(s) in materials or workmanship within specified warranty period.

- 1. Warranty Period: 5 years from date of Substantial Completion.

1.9 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect assembled motors, according to IEEE standards.

1.10 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 16 Section "Identification for Electrical Systems."

1.11 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Prepare test and inspection reports.

1.12 ADJUSTING

- A. Adjust motor and couplings to function smoothly, and lubricate as recommended by manufacturer.

PART 2 PRODUCTS

2.1 GENERAL

- A. Unless specific exception is stated, all motors shall meet the minimum efficiencies required by the Energy Independence and Security Act of 2007 and the 2014 Department of Energy revisions.
 - 1. All polyphase, continuous duty motors shall meet the requirements of NEMA MG1-2016, Table 12-12 for premium efficiency motors.
 - 2. All polyphase motors operated at constant torque with variable speed over large speed ranges (less than or equal to 50% to 100% of rated speed) shall be rated inverter-duty.
 - 3. All other general purpose motors shall meet the efficiency requirements of NEMA MG1-2016, Table 12-11 for energy efficient motors.
- B. Standard efficiency motors shall not be supplied. In addition, all motors shall have a minimum power factor rating of .85 at full load; motors rated at a lower power factor shall not be supplied.
- C. Provide motors in accordance with standard NEMA type classifications as specified. The use of industry standard sub classifications such as "Mill and Chemical" motors and similar "standard" heavy-duty designs are encouraged where they meet or exceed the specified minimum requirements.
- D. All Motors shall be suitable both electrically and mechanically to drive the connected equipment under any and all modes of operation. The speed, horsepower, torque, base, bearing, shaft, insulation, and enclosure shall be closely coordinated with equipment requirements specified herein and in other portions of this specification so as to provide

a satisfactory, efficient drive without overloading, overheating, abnormal noise or vibration.

- E. All Motors shall be designed and built for long, trouble-free life in industrial service and shall be capable of operating successfully under the following application conditions:
 - 1. 104 Degrees F maximum ambient temperature to minus 4 Degrees F minimum ambient temperature.
 - 2. 3,000 feet maximum altitude.
 - 3. Voltage variations to plus or minus 10 percent of nameplate rating.
 - 4. Frequency variations to plus or minus 5 percent of nameplate rating.
 - 5. Variable speed motors shall be suitable for use with variable speed controller.
- F. All motors shall be rated for full voltage starting, NEMA Design B, normal torque, normal starting current, unless otherwise required by the driven equipment or specified.
- G. All motors shall be suitable for the environment in which they are to be installed.

2.2 ENCLOSURES

- A. Totally enclosed fan cooled (TEFC) unless otherwise specified.
- B. Hazardous areas: Class 1 Division 1 - explosion proof non-ventilated - (XPNV) or fan cooled (XPFC).
- C. Class 1 Division 2, Hazardous areas; totally enclosed fan cooled (TEFC) with marking "Suitable for Class 1 Division 2" area. Motors not specifically listed for Class 1 Division 2 areas shall be explosion proof.

2.3 MOTOR ACCESSORIES

- A. Motor Leads: Provide motor leads compatible with motor insulation system, permanently identified.
- B. Eyebolts: Provide drilling and tapping for eyebolts on all motors weighing more than 83 pounds.
- C. Nameplates: Provide two engraved stainless-steel stamped metal nameplates (one for the motor and one for mounting in the Motor Control Enclosure MCC starter bucket), with the information required by NEMA-MG1-2016-10.39 and the following additional information:
 - 1. Maximum ambient temperature for which motor is rated.

2. Class of insulation.
 3. Service factor.
 4. Bearing par number.
 5. Motor connection diagram if more than three leads.
 6. Power rating in kW if driven equipment ratings are given in metric units.
 7. Voltage and wattage of internal space heaters
 8. Locked Rotor Power Factor
- D. All single-phase motors shall be self-protected unless specified "for separate protection", and the self-protection characteristic shall be indicated on the motor nameplate. Protection shall be manual or automatic-reset type as specified or required by safety considerations of the equipment served.
 - E. Single phase motors shall be provided with start capacitors if necessary for proper operation of the motor. The start capacitors shall be located within the motor housing.
 - F. Enclosed Motors: Provide drain plugs for non-explosion proof motors and drain and breather for explosion proof motors.
 - G. Finish: Provide a prime and final finish of the manufacturer's standard colors.
 - H. Provide embedded thermostats for thermal alarm or motor cut out for all motors 5 Hp and above unless otherwise shown.

2.4 MOTOR TERMINAL CONNECTION BOX

- A. Provide a terminal connection box two sizes larger than normal to allow extra room for motor feeder splices. Refer to Motor Terminal Splice Insulation, 16120.
- B. Conduit Entrance: Provide conduit entrance box on the right-hand side of all horizontal motors, when facing motor end opposite shaft extension unless otherwise detailed on the drawings or required by the unique characteristics of the equipment served. Provide conduit entrance box size and drilling to conform to the conduit or wiring requirements indicated on the electrical drawings. Include motor leads and all accessory leads in a common conduit entrance box.

2.5 INSULATION CLASS

- A. Provide NEMA Class F insulation with additional nonhygroscopic moisture protection which will maintain a minimum resistance of 1.0 megohms after 168 hours of exposure at 100 percent humidity. The temperature rise, as measured by resistance when

operating at rated service factor, and load shall conform to the limiting observable temperatures in NEMA-MG1, for class B insulation.

- B. Class A insulating materials shall not be utilized.
- C. Motors on Variable Frequency Controllers (VFC'S)
 - 1. Motors for use with VFD's shall be inverter duty rated. Inverter duty rated motors shall meet the requirements of NEMA MG1-2016, Part 31. Insulation rating shall be 2100V minimum. The Contractor shall coordinate between the VFD and motor manufacturers to provide a motor/VFD combination suitable for the application.
 - 2. Provide motors with adequate cooling for the lowest expected speed for load served.
 - 3. Any line terminators, filtering devices, harmonic filters, line reactors, or other devices required for proper operation of the motor/VFD combination shall be provided and installed by the Contractor at no additional cost to the Owner.
 - a. For motors on VFD's,
 - 1) Provide data on expected speed range of load being served.
 - 2) Provide proof of inverter duty rating and insulation rating as specified.

2.6 SERVICE FACTOR

- A. The rated nameplate horsepower of the motor, when operating at a service factor of 1.0, shall be equal to or greater than the horsepower required to drive the connected equipment under any and all modes of operation.
 - 1. Provide motors with a 1.15 service factor.

2.7 SUBMERSIBLE MOTORS

- A. Definite purpose submersible motors shall conform to the following:
 - 1. Motor shall be designed for service in a liquid temperature of 80 Degrees F. Set controls to permit operation only when fully submerged unless specifically rated for non-submerged duty.
 - 2. Motor shall have two mechanical seals; the lower one outside the motor and protecting the upper one which shall be in an oil filled chamber.
 - 3. Provide embedded thermostats for thermal alarm or motor cut-out.

4. Provide water detector probes in seal oil chamber and required relay necessary for interface to the control system.
5. Provide one or more multiconductor cables of approved construction and suitable length to extend from the motor to the indicated receptacle or junction box. Provide strain relief for the cable.
6. Separate cables shall be provided for power and alarm conductors.
7. Provide control wiring connection diagram and all necessary components, relays, etc. for the required and proper control and shutdown of the motor. Provide descriptive information to the Engineer and System Integrator on the control of the equipment.

2.8 POWER RATINGS

- A. Motor horsepower, if indicated in the detailed equipment specifications, are minimum size acceptable.
- B. Ratings indicated on the electrical drawings are for guidance only and do not limit the equipment size.
- C. Frame/hp relationships shall conform to the latest NEMA standards for "T" or "U" frames, and all dimensions shall meet NEMA standards.

2.9 SYNCHRONOUS SPEED

- A. In general, the motor speed indicated is the rated synchronous speed. Provide motor rated full-load speeds which are compatible with the specified performance of the driven equipment.

2.10 STANDARD RATED VOLTAGE, PHASE AND FREQUENCY

- A. Provide motors nameplate-rated for 60 hertz power supply as follows unless otherwise specified or shown on the drawings:
 1. Motors less than 1/6 hp, single-phase, 115V.
 2. Motors 1/6 hp to 1/2 hp, single-phase, 115/230V.
 3. Motors 1/2 hp through 100 hp, three-phase 230/460V.
 4. Multi-speed and part winding start motors may have single voltage rating if manufacturer's standard.
- B. Conform to the specified service conditions and the equipment specifications without reduction in the service factor.

2.11 BEARINGS AND SHAFTS

- A. All bearings shall be anti-friction-type AFBMA standard sizes. All motors shall provide a minimum bearing life of 20,000 hours. All motors shall have thrust ratings not less than the combined static and dynamic loads to be imposed.
- B. Shafts shall be in accordance with NEMA "T" or "TS" dimensions. Long shafts shall be suitable for belt, chain or gear drive within limits established by good industrial practice and documented by NEMA. Short shafts shall be used for direct connection. Vertical motors shall be the solid-shaft type except where application requires a hollow-shaft design.
- C. Balance and Vibration: Conform to NEMA standard, MG1, latest revision.

2.12 DUTY CYCLE

- A. Provide motors rated for continuous duty unless otherwise specified.

2.13 LUBRICATION

- A. Horizontal polyphase motors shall be grease lubricated. The bearing housing shall be large enough to hold sufficient lubricant to minimize the need for frequent relubrication but facilities shall be provided for adding new grease and draining out old grease without major motor disassembly. Motors 180T frame and smaller may utilize grease release fitting in lieu of grease drain plug. The bearing housing shall have long, tight, running fits or rotating seals to protect against the entrance of foreign matter into the bearings or leakage of grease out of the bearing cavity.
- B. Vertical polyphase motor lubrication shall conform to the motor manufacturer's recommendations. Except as otherwise recommended, guide bearings shall be ball bearings, grease lubricated; thrust bearings shall be grease lubricated through frame 280T, oil lubricated in larger frame sizes.

2.14 SHAFT GROUNDING RING

- A. All motors 100 HP or larger that operated on variable frequency drives shall be equipped with a maintenance-free, conductive microfiber shaft grounding ring to meet NEMA MG1, 31.4.4.3 requirements, with a minimum of two rows of circumferential microfibers to discharge damaging shaft voltages away from the bearings to ground. SGR's Service Life: Designed to last for service life of motor. Provide AEGIS SGR Conductive MicroFiber Shaft Grounding Ring, or approved equal.
- B. Application Note: Motors up to 100 HP shall be provided with one shaft grounding ring installed on either the drive end or non-drive end. Motors over 100 HP shall be provided with an insulated bearing on the non-drive end and a shaft grounding ring on the drive end of the motor with the exception of line contact bearings in the drive end of the machine. In this instance, the line contact bearing must be electrically insulated, and the AEGIS Bearing Protection Ring installed on the opposite drive end of the motor.

Grounding rings shall be provided and installed by the motor manufacturer or contractor and shall be installed in accordance with the shaft grounding ring manufacturer's recommendations.

2.15 EFFICIENCY

- A. Efficiency shall be determined by testing production motors with a dynamometer at rated output, voltage and frequency in accordance with IEEE Specification 112A, Paragraph B.

2.16 SHOP TESTS

- A. Each polyphase motor shall be given a routine test to determine that it is free from electrical or mechanical defects and provide assurance that it meets the specifications. The routine test shall conform to applicable NEMA and IEEE Standards latest revision and shall be as generally defined as "Standard Commercial Test."
- B. Copies of the test report will not be required unless actual operation and installation suggest the motors' performance should be verified, in which case certified copies of the test report shall be submitted upon the Engineer's request.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Motors shall be factory installed on common bases, stands, etc., with the driven equipment. Provide suitable couplings and guards between motor and driven equipment.
- B. Align and connect to driven equipment.
- C. Provide suitable personnel guards over all shafts, couplings, or others exposed moving parts.
- D. Connect motors to power supply and controllers.
- E. Verify correct rotation of equipment.
- F. Connect motor leads with a splice kit specifically designed for motor lead connection as described in Section 16119.

3.2 INSTALLATION CHECK

- A. Provide services of an experienced, competent, and authorized representative of manufacturer to visit site of work and inspect, check, adjust if necessary, and approve equipment installation for motors.

- B. Assure that equipment manufacturer's representative is present when equipment is placed in operation.
- C. Verify that equipment representative revisits job site as often as necessary until all trouble is corrected and equipment installation and operation are satisfactory, in opinion of Engineer.
- D. Verify that motor overcurrent protection is in accordance with the NEC.
- E. Verify the motor protection and control is in accordance with the equipment manufacturers requirements.
- F. The Contractor shall open each motor terminal box for inspection by the Engineer.

3.3 SHAFT GROUND RINGS

- A. Shaft grounding rings (SGR) shall be factory installed inside the motors by the manufacturer wherever possible. SGR's may be field installed by installing contractor subject to Engineer's approval. Provide AEGIS SGR Colloidal Silver Shaft Coating, or approved equal, on shafts prior to rings installation, per SGR manufacturer's recommendations, after first cleaning shafts.
- B. Install and test SGR's in accordance with manufacturer's recommendations. Install the SGR so that the aluminum frame maintains an even clearance around the shaft. Conductive microfibers shall be in full circumferential contact with conductive metal surface of the shaft. Do not use thread lock to secure the mounting screws as it may compromise the conductive path to ground. If thread lock is required, use a small amount of EP2400 AEGIS Conductive Epoxy, or approved equal, to secure the screws in place.
- C. Shafts shall be clean and free of any coatings, paint, or other nonconductive material (clean to bare metal). Depending upon the condition of the shaft, it may require using emery cloth or Scotch-Brite. If the shaft is visibly clean, a non-petroleum based solvent may be used to remove any residue. Check the conductivity of the shaft using an ohm meter. Ohms test: Place the positive and negative meter leads on the shaft at a place where the microfibers will contact the shaft. Each motor will have a different reading but in general one should have a maximum reading of less than 2 ohms. If the reading is higher, clean the shaft again and retest.
- D. After motors with SGR are fully installed in the field (in equipment, assemblies, or individually), for both factory-installed-SGR and field-installed-SGR cases, test for a conductive path to ground using an Ohm meter. Place one probe on metal frame of SGR and one probe on motor frame. Motor must be grounded to common earth ground with variable frequency drive according to applicable standards. Verify that SGR installations and test readings comply with SGR manufacturer's requirements.

3.4 TESTS

- A. Perform tests and inspections as specified in Section 16670 "Electrical Testing".

END OF SECTION

SECTION 16213
LOW-VOLTAGE DISTRIBUTION TRANSFORMERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes distribution, dry-type transformers with a nominal primary and secondary rating of 600 V and less, with capacities up to 1500 kVA.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type and size of transformer.
 - 2. Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer.
- B. Shop Drawings:
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
 - 3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Seismic Qualification Data: Certificates, for transformers, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 4. Certification: Indicate that equipment meets Project seismic requirements.
 - C. Source quality-control reports.
 - D. Field quality-control reports.
- 1.5 CLOSEOUT SUBMITTALS
 - A. Operation and Maintenance Data: For transformers to include in emergency, operation, and maintenance manuals.
- 1.6 QUALITY ASSURANCE
 - A. Testing Agency Qualifications: Accredited by NETA.
 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
- 1.7 DELIVERY, STORAGE, AND HANDLING
 - A. Inspection: On receipt, inspect for and note any shipping damage to packaging and transformer.
 1. If manufacturer packaging is removed for inspection, and transformer will be stored after inspection, re-package transformer using original or new packaging materials that provide protection equivalent to manufacturer's packaging.
 - B. Storage: Store in a warm, dry, and temperature-stable location in original shipping packaging.
 - C. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.
 - D. Handling: Follow manufacturer's instructions for lifting and transporting transformers.
- 1.8 COORDINATION
 - A. Coordinate size and location of concrete bases with actual transformer provided. Cast ancho-bolt inserts into bases. Concrete, reinforcement and formwork requirements are specified in Division 3.

- B. Coordinate installation of wall-mounting and structure-hanging supports with actual transformer provided.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Eaton.
 - 2. Federal Pacific.
 - 3. General Electric Company.
 - 4. Siemens Industry, Inc., Energy Management Division.
 - 5. Square D; by Schneider Electric.
- B. Source Limitations: Obtain each transformer type from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Transformers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the transformer will remain in place without separation of any parts when subjected to the seismic forces specified and the transformer will be fully operational after the seismic event."

2.3 GENERAL TRANSFORMER REQUIREMENTS

- A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.
- B. Comply with NFPA 70.
 - 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- C. Transformers Rated 15 kVA and Larger:
 - 1. Comply with 10 CFR 431 (DOE 2016) efficiency levels.

- 2. Marked as compliant with DOE 2016 efficiency levels by a NRTL.
- D. Shipping Restraints: Paint or otherwise color-code bolts, wedges, blocks, and other restraints that are to be removed after installation and before energizing. Use fluorescent colors that are easily identifiable inside the transformer enclosure.

2.4 DISTRIBUTION TRANSFORMERS

- A. Comply with NFPA 70, and list and label as complying with UL 1561.
- B. Provide transformers that are constructed to withstand seismic forces specified in Section 16148 "Seismic Controls for Electrical Systems."
- C. Cores: Electrical grade, non-aging silicon steel with high permeability and low hysteresis losses.
 - 1. One leg per phase.
 - 2. Core volume shall allow efficient transformer operation at 10 percent above the nominal tap voltage.
 - 3. Grounded to enclosure.
- D. Coils: Continuous windings without splices except for taps.
 - 1. Coil Material: Aluminum.
 - 2. Internal Coil Connections: Brazed or pressure type.
 - 3. Terminal Connections: Bolted.
- E. Encapsulation: Transformers smaller than 30 kVA shall have core and coils completely resin encapsulated.
- F. Enclosures
 - 1. Indoor Areas: Ventilated.
 - a. NEMA 250, Type 2: Core and coil shall be encapsulated within resin compound using a vacuum-pressure impregnation process to seal out moisture and air.
 - b. KVA Ratings: Based on convection cooling only and not relying on auxiliary fans.
 - c. Wiring Compartment: Sized for conduit entry and wiring installation.

- d. Finish: Comply with NEMA 250.
 - 1) Finish Color: ANSI 61 gray weather-resistant enamel.
- 2. Outdoor Areas: Ventilated.
 - a. NEMA 250, Type 3R: Core and coil shall be encapsulated within resin compound using a vacuum-pressure encapsulation process to seal out moisture.
 - b. KVA Ratings: Based on convection cooling only and not relying on auxiliary fans.
 - c. Wiring Compartment: Sized for conduit entry and wiring installation.
 - d. Finish: Comply with NEMA 250.
 - 1) Finish Color: ANSI 61 gray weather-resistant enamel.
- 3. Corrosive Areas: Ventilated.
 - a. NEMA 250, Type 4X, Stainless Steel: Core and coil shall be cast in resin under vacuum-pressure.
 - b. KVA Ratings: Based on convection cooling only and not relying on auxiliary fans.
 - c. Wiring Compartment: Sized for conduit entry and wiring installation.
 - d. Finish: None.
- G. Taps for Transformers 3 kVA and Smaller: None.
- H. Taps for Transformers 7.5 to 24 kVA: One 5 percent tap above and one 5 percent tap below normal full capacity.
- I. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.
- J. Insulation Class, Smaller Than 30 kVA: 180 deg C, UL-component-recognized insulation system with a maximum of 115 deg C rise above 40 deg C ambient temperature.
- K. Insulation Class, 30 kVA and Larger: 220 deg C, UL-component-recognized insulation system with a maximum of 80 deg C rise above 40 deg C ambient temperature.
- L. Grounding: Provide ground-bar kit or a ground bar installed on the inside of the transformer enclosure.

- M. K-Factor Rating: Transformers indicated to be K-factor rated shall comply with UL 1561 requirements for nonsinusoidal load current-handling capability to the degree defined by designated K-factor.
1. Unit shall not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor, without exceeding the indicated insulation class in a 40 deg C maximum ambient and a 24-hour average ambient of 30 deg C.
 2. Indicate value of K-factor on transformer nameplate.
 3. Unit shall comply with requirements of DOE 2016 efficiency levels when tested according to NEMA TP 2 with a K-factor equal to one.
- N. Electrostatic Shielding: Each winding shall have an independent, single, full-width copper electrostatic shield arranged to minimize interwinding capacitance.
1. Arrange coil leads and terminal strips to minimize capacitive coupling between input and output terminals.
 2. Include special terminal for grounding the shield.
- O. Neutral: Rated 200 percent of full load current for K-factor-rated transformers.
- P. Wall Brackets: Manufacturer's standard brackets.
- Q. Low-Sound-Level Requirements: Minimum of 3 dBA less than NEMA ST 20 standard sound levels when factory tested according to IEEE C57.12.91.
- R. Low-Sound-Level Requirements: Maximum sound levels when factory tested according to IEEE C57.12.91, as follows:
1. 9.00 kVA and Less: 40 dBA.
 2. 9.01 to 30.00 kVA: 45 dBA.
 3. 30.01 to 50.00 kVA: 45 dBA for K-factors of 1, 4, and 9.
 4. 50.01 to 150.00 kVA: 50 dBA for K-factors of 1, 4, and 9.
 5. 150.01 to 300.00 kVA: 55 dBA for K-factors of 1, 4, and 9.
 6. 300.01 to 500.00 kVA: 60 dBA for K-factors of 1, 4, and 9.
 7. 500.01 to 700.00: 62 dBA for K-factors of 1, 4, and 9.
 8. 700.01 to 1000.00: 64 dBA for K-factors of 1, 4, and 9.

2.5 IDENTIFICATION

- A. Nameplates: Engraved, laminated-acrylic or melamine plastic signs for each distribution transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 16153 "Identification for Electrical Systems."

2.6 SOURCE QUALITY CONTROL

- A. Test and inspect transformers according to IEEE C57.12.01 and IEEE C57.12.91.
 - 1. Resistance measurements of all windings at rated voltage connections and at all tap connections.
 - 2. Ratio tests at rated voltage connections and at all tap connections.
 - 3. Phase relation and polarity tests at rated voltage connections.
 - 4. No load losses, and excitation current and rated voltage at rated voltage connections.
 - 5. Impedance and load losses at rated current and rated frequency at rated voltage connections.
 - 6. Applied and induced tensile tests.
 - 7. Regulation and efficiency at rated load and voltage.
 - 8. Insulation-Resistance Tests:
 - a. High-voltage to ground.
 - b. Low-voltage to ground.
 - c. High-voltage to low-voltage.
 - 9. Temperature tests.
- B. Factory Sound-Level Tests: Conduct sound-level tests on equipment for this Project.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.

- B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.
- D. Verify that ground connections are in place and requirements in Section 16126 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.
- E. Environment: Enclosures shall be rated for the environment in which they are located. Covers for NEMA 250, Type 4X enclosures shall not cause accessibility problems.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install wall-mounted transformers level and plumb with wall brackets fabricated by transformer manufacturer.
 - 1. Coordinate installation of wall-mounted and structure-hanging supports with actual transformer provided.
 - 2. Brace wall-mounted transformers as specified in Section 16148 "Seismic Controls for Electrical Systems."
- B. Install transformers level and plumb on a concrete base with vibration-dampening supports. Locate transformers away from corners and not parallel to adjacent wall surface.
- C. Construct concrete bases according to Section 03300 "Cast-in-Place Concrete" and anchor floor-mounted transformers according to manufacturer's written instructions, seismic codes applicable to Project, and requirements in Section 16129 "Hangers and Supports for Electrical Systems."
 - 1. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
- D. Secure transformer to concrete base according to manufacturer's written instructions.
- E. Secure covers to enclosure and tighten all bolts to manufacturer-recommended torques to reduce noise generation.
- F. Remove shipping bolts, blocking, and wedges.

3.3 CONNECTIONS

- A. Ground equipment according to Section 16126 "Grounding and Bonding for Electrical Systems."
- B. Connect wiring according to Section 16119 "Low-Voltage Electrical Power Conductors and Cables."
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- D. Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmission to the building structure.

3.4 FIELD QUALITY CONTROL

- A. Perform Tests and inspections as specified in Section 16670 "Electrical Testing".

3.5 ADJUSTING

- A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 5 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.
- B. Output Settings Report: Prepare a written report recording output voltages and tap settings.

3.6 CLEANING

- A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION

SECTION 16321
GASEOUS ENGINE GENERATORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes packaged engine generators for non-emergency use with the following features:
 - 1. Natural gas engine.
 - 2. Gaseous fuel system.
 - 3. Control and monitoring.
 - 4. Generator overcurrent and fault protection.
 - 5. Generator, exciter, and voltage regulator.
 - 6. Load banks.
 - 7. Outdoor generator-set enclosure.
 - 8. Remote radiator motors.
 - 9. Vibration isolation devices.
 - 10. Finishes.
- B. Related Requirements:
 - 1. Section 16475 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine generators.

1.3 DEFINITIONS

- A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Include thermal damage curve for generator.
3. Include time-current characteristic curves for generator protective device.
4. Include fuel consumption in cubic feet per hour (cubic meters per hour) at 0.8 power factor at 0.5, 0.75 and 1.0 times generator capacity.
5. Include generator efficiency at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
6. Include air flow requirements for cooling and combustion air in cfm at 0.8 power factor, with air supply temperature of 95 deg F. Provide drawings showing requirements and limitations for location of air intake and exhausts.
7. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactances, and short-circuit current capability.
8. Include generator sizing report meeting project specific starting requirements as indicated in these specifications and on project one-line diagrams for normal operating conditions at the project site.

B. Shop Drawings:

1. Include plans and elevations for engine generator and other components specified.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include base weights.
6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for EPS equipment and functional relationship between all electrical components.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Seismic Qualification Data: Certificates, for engine generator, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: With engine and generator mounted on rails, identify center of gravity and total weight, supplied enclosure, and each piece of equipment not integral to the engine generator, and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Source Quality-Control Reports: Including, but not limited to, the following:
 - 1. Certified summary of prototype-unit test report.
 - 2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
 - 3. Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.
 - 4. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
 - 5. Report of sound generation.
 - 6. Report of exhaust emissions showing compliance with applicable regulations.
- D. Field quality-control reports.
- E. Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For engine generators to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 01730, include the following:

- a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
- b. Operating instructions laminated and mounted adjacent to generator location.
- c. Training plan.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.
 - 2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
 - 3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.
 - 4. Tools: Each tool listed by part number in operations and maintenance manual.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Caterpillar, Inc.; Electric Power Division.

2. Cummins Power Generation.
 3. Generac Power Systems, Inc.
 4. Kohler Power Systems.
 5. MTU America Inc.
- B. Source Limitations: Obtain packaged engine generators and auxiliary components through one source from a single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Engine generator housing, engine generator, batteries, battery racks, silencers, load banks, and sound attenuating equipment, accessories, and components shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 2. Shake-table testing shall comply with ICC-ES AC156. Testing shall be performed with all fluids at worst-case normal levels.
 3. Component Importance Factor: 1.0.
- B. B11 Compliance: Comply with B11.19.
- C. NFPA Compliance:
1. Comply with NFPA 37.
 2. Comply with NFPA 70.
- D. UL Compliance: Comply with UL 2200.
- E. Engine Exhaust Emissions: Comply with applicable EPA emissions requirements for EPA New Source Performance Standards for stationary emergency engines and applicable state and local government standards.
- F. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by engine generator including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation. Maximum noise level shall be 75dB measured at 23 feet from enclosure, or local requirements, whichever is more stringent.

- G. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - 1. Ambient Temperature: 5 to 104 deg F.
 - 2. Relative Humidity: Zero to 95 percent.
 - 3. Altitude: Sea level to 3000 feet.

2.3 ENGINE GENERATOR ASSEMBLY DESCRIPTION

- A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended location and use.
- C. Governor: Adjustable isochronous, with speed sensing.
- D. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.
 - 1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.
- E. Capacities and Characteristics:
 - 1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries, with capacity as required to operate as a unit as evidenced by records of prototype testing.
 - 2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of components.
- F. Engine Generator Performance:
 - 1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
 - 2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.

3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
 4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
 5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
 6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
 7. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
 8. Start Time: Comply with NFPA 110, Type 10, system requirements.
- G. Engine Generator Performance for Sensitive Loads:
1. Oversizing generator compared with the rated power output of the engine is permissible to meet specified performance.
 - a. Nameplate Data for Oversized Generator: Show ratings required by the Contract Documents rather than ratings that would normally be applied to generator size installed.
 2. Steady-State Voltage Operational Bandwidth: 1 percent of rated output voltage from no load to full load.
 3. Transient Voltage Performance: Not more than 10 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 0.5 second.
 4. Steady-State Frequency Operational Bandwidth: Plus or minus 0.25 percent of rated frequency from no load to full load.
 5. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.

6. Transient Frequency Performance: Less than 2-Hz variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within three seconds.
7. Output Waveform: At no load, harmonic content measured line to neutral shall not exceed 2 percent total with no slot ripple. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
8. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to winding insulation or other generator system components.
9. Excitation System: Performance shall be unaffected by voltage distortion caused by nonlinear load.
 - a. Provide permanent magnet excitation for power source to voltage regulator.
10. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.4 GASEOUS ENGINE

- A. Fuel: Natural gas.
- B. Rated Engine Speed: 1800 rpm.
- C. Lubrication System: Engine or skid mounted.
 1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
 2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
 3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
- D. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with UL 499.
- E. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator mounting frame and integral engine-driven coolant pump.
 1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.

2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
 4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.
 - a. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.
 - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
- F. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
1. Minimum sound attenuation of 25 dB at 500 Hz.
 2. Sound level measured at a distance of 25 feet from exhaust discharge after installation is complete shall meet the requirements of Paragraph 2.2.F of this section.
- G. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- H. Starting System: 12 or 24-V electric, with negative ground.
1. Components: Sized so they are not damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Performance Requirements" Article.
 2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
 3. Cranking Cycle: 60 seconds.
 4. Battery: Adequate capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least three times without recharging.

5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 50 deg F regardless of external ambient temperature within range specified in "Performance Requirements" Article. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.
7. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
8. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35 A minimum continuous rating.
9. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:
 - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
 - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg F to 140 deg F to prevent overcharging at high temperatures and undercharging at low temperatures.
 - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
 - d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
 - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.

2.5 GASEOUS FUEL SYSTEM

- A. Gas Train: Comply with NFPA 37.

- B. Engine Fuel System:
- C. Natural Gas, Vapor-Withdrawal System:
 - 1. Carburetor.
 - 2. Fuel-Shutoff Solenoid Valves: NRTL-listed, normally closed, safety shutoff valves; one for each fuel source.
 - 3. Fuel Filters: One for each fuel type.
 - 4. Manual Fuel Shutoff Valves: One for each fuel type.
 - 5. Flexible Fuel Connectors: Minimum one for each fuel connection.
- D. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates generator-set shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- E. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts engine generator. The off position of same switch initiates generator-set shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- F. Provide minimum run time control set for 15 minutes with override only by operation of a remote emergency-stop switch.
- G. Comply with UL 508A.
- H. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from generator-set vibration. Panel shall be powered from the engine generator battery.
- I. Control and Monitoring Panel:
 - 1. Digital controller with integrated LCD, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.
 - 2. Instruments: Located on the control and monitoring panel and viewable during operation.

- a. Engine lubricating-oil pressure gage.
 - b. Engine-coolant temperature gage.
 - c. DC voltmeter (alternator battery charging).
 - d. Running-time meter.
 - e. AC voltmeter, for each phase.
 - f. AC ammeter, for each phase.
 - g. AC frequency meter.
 - h. Generator-voltage adjusting rheostat.
3. Controls and Protective Devices: Controls, shutdown devices, and common visual alarm indication, including the following:
- a. Cranking control equipment.
 - b. Run-Off-Auto switch.
 - c. Control switch not in automatic position alarm.
 - d. Overcrank alarm.
 - e. Overcrank shutdown device.
 - f. Low water temperature alarm.
 - g. High engine temperature prealarm.
 - h. High engine temperature.
 - i. High engine temperature shutdown device.
 - j. Overspeed alarm.
 - k. Overspeed shutdown device.
 - l. Coolant low-level alarm.
 - m. Coolant low-level shutdown device.
 - n. Coolant high-temperature prealarm.
 - o. Coolant high-temperature alarm.

- p. Coolant low-temperature alarm.
- q. Coolant high-temperature shutdown device.
- r. EPS supplying load indicator.
- s. Battery high-voltage alarm.
- t. Low cranking voltage alarm.
- u. Battery-charger malfunction alarm.
- v. Battery low-voltage alarm.
- w. Contacts for local and remote common alarm.
 - 1) Provide status contacts as indicated on the drawings.
- x. Hours of operation.
- y. Engine generator metering, including voltage, current, Hz, kW, kVA, and power factor.
- z. Generator overcurrent protective device not closed alarm.

J. Connection to Datalink:

- 1. A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication.
- 2. Provide connections for datalink transmission of indications to remote data terminals via ModBus or Ethernet TCP/IP. If Modbus communication is used, provide converter to allow communication with Allen Bradley Compactlogix Ethernet TCP/IP.

- K. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

2.6 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator Circuit Breaker: Molded-case, electronic-trip type; 100 percent rated; complying with UL 489.
- 1. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.
 - 2. Trip Settings: Selected to coordinate with generator thermal damage curve.

3. Shunt Trip: Connected to trip breaker when engine generator is shut down by other protective devices.
 4. Mounting: Adjacent to or integrated with control and monitoring panel.
- B. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other generator-set protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector performs the following functions:
1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms. Contacts shall be available for load shed functions.
 2. Under single or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
 3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the engine generator.
 4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.

2.7 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Type: Permanent Magnet
- C. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- D. Electrical Insulation: Class H or Class F.
- E. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.
- F. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- G. Enclosure: Dripproof.
- H. Instrument Transformers: Mounted within generator enclosure.

- I. Voltage Regulator: Solid-state type, separate from exciter.
 - 1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
 - 2. Maintain voltage within 15 percent on one step, full load.
 - 3. Provide anti-hunt provision to stabilize voltage.
 - 4. Maintain frequency within 5 percent and stabilize at rated frequency within 2 seconds.
- J. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
- K. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
- L. Subtransient Reactance: 12 percent, maximum.

2.8 OUTDOOR GENERATOR-SET ENCLOSURE

- A. Description: Vandal-resistant, sound-attenuating, weatherproof steel housing, wind resistant up to 100 mph. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.
- B. Structural Design and Anchorage: Comply with ASCE/SEI 7 for wind loads.
- C. Hinged Doors: With padlocking provisions.
- D. Space Heater: Thermostatically controlled and sized to prevent condensation.
- E. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.
- F. Muffler Location: As recommended by manufacturer.
- G. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.
 - 1. Louvers: Fixed-engine, cooling-air inlet and discharge. Storm-proof and drainable louvers with bird screens to prevent entry of rain, snow, exterior dust, birds and rodents.
 - 2. Ventilation: Provide temperature-controlled exhaust fan interlocked to prevent operation when engine is running.

- H. Convenience Outlets: Factory wired, GFCI. Arrange for external electrical connection.

2.9 VIBRATION ISOLATION DEVICES

- A. Vibration Isolation Devices: As recommended by the manufacturer and approved via seismic qualification submittal data to meet project requirements. Vibration isolation devices may be one of the following types:
 - 1. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
 - a. Material: Standard neoprene or as recommended by the manufacturer separated by steel shims.
 - 2. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
 - a. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch-thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 - b. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.
 - c. Minimum Additional Travel: 50 percent of required deflection at rated load.
 - d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 3. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

2.10 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.11 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
 - 1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.
- B. Project-Specific Equipment Tests: Before shipment, factory test engine generator and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
 - 1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
 - 2. Test generator, exciter, and voltage regulator as a unit.
 - 3. Full load run.
 - 4. Maximum power.
 - 5. Voltage regulation.
 - 6. Transient and steady-state governing.
 - 7. Single-step load pickup.
 - 8. Safety shutdown.
 - 9. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
 - 10. Report factory test results within 10 days of completion of test.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.
- B. Examine roughing-in for piping systems and electrical connections. Verify actual locations of connections before packaged engine generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 404.
- B. The generator set shall be installed by an authorized representative of the manufacturer of the generator set in accordance with the installation drawings and instructions prepared by the manufacturer. Installation shall be performed by workers who are skilled and experienced in the installation of generator sets and electrical systems.
- C. Install fuel system, ventilation system and exhaust system in accordance to the requirements of the drawings, specifications, manufacturer, local codes and the NEC. Any additional requirements or equipment necessary for a complete installation shall be provided by the Contractor at no additional expense to the Owner.
- D. Control Panel and Circuit Breaker Mounting:
 - 1. The control panel shall be installed so that there is a minimum of 3 feet clear space in front of the panel and the top of the panel is no more than 6 feet above finished floor.
 - 2. Install the control panel for the generator on the generator at a height no more than 6 feet above the finished floor to the top of the control panel. If the control panel mounted on the generator is higher than 6 feet, then the Contractor shall mount the control panel on a separate stand or on the wall. The Contractor shall provide all necessary raceway, wiring, and mounting equipment at no additional cost to the Owner.
 - 3. The main circuit breaker shall be installed so that there is a minimum of 3-1/2 feet of clear space in front of the breaker. The Contractor shall coordinate the breaker installation with the generator manufacturer to meet this requirement.
 - 4. The installation and space requirements stated above shall be verified prior to construction. Any discrepancies shall be stated in the submittals.
 - 5. If the physical size of the structure which the generator is being installed in will not allow for these space requirements, the Contractor shall ring this to the immediate attention of the Engineer.
- E. Equipment Mounting:
 - 1. Install packaged engine generators on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 03300 "Cast-in-Place Concrete."
 - 2. Coordinate size and location of concrete bases for packaged engine generators and remote radiators mounted on grade. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

- 3. Install packaged engine generator with vibration isolation devices having a minimum deflection of 1 inch on 4-inch-high concrete base. Secure engine generator to anchor bolts installed in concrete bases.
- F. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- G. If engine generator is under building cover or inside:
 - 1. Exhaust System: Install Schedule 40, black steel piping with welded joints and connect to engine muffler. Install thimble at wall/ceiling/roof as indicated. Piping shall be same diameter as muffler outlet.
 - a. Install isolating thimbles where exhaust piping penetrates combustible surfaces with a minimum of 9-inch clearance from combustibles.
 - 2. Drain Piping: Install condensate drain piping to muffler drain outlet with a shutoff valve, stainless-steel flexible connector, and Schedule 40, black steel pipe, the full size of the drain connection, with welded joints.
- H. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.
- B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.
- C. Connect cooling-system water piping to engine generator set with flexible connectors.
- D. Connect engine exhaust pipe to engine with flexible connector.
- E. Gaseous Fuel Connections:
 - 1. Connect fuel piping to engines with a gate valve and union and flexible connector.
 - 2. Install manual shutoff valve in a remote location to isolate gaseous fuel supply to the generator.
 - 3. Vent gas pressure regulators outside building a minimum of 60 inches from building openings.
- F. Ground equipment according to Section 16126 "Grounding and Bonding for Electrical Systems."

- G. Connect wiring according to Section 16119 "Conductors and Cables." Provide a minimum of one 90-degree bend in flexible conduit routed to the engine generator from a stationary element.
- H. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

3.4 INSPECTION AND VERIFICATION OF INSTALLATION

- A. After completion of the generator set installation, the manufacturer shall inspect the installation and verify that all components and wiring are correctly installed. The manufacturer shall determine the exact scope and nature of work required to correct deficiencies and errors in the work and shall supervise the performance of such work.
 - 1. All components of the generator set shall be calibrated by the manufacturer after the completion of the installation. Each component shall be adjusted to be within the manufacturer's required range and for the specific application. Components that cannot be properly calibrated or that are found to exceed the manufacturer's specified range or accuracy shall be removed and replaced.
 - 2. After installation of the generator set is completed, the generator set shall be placed into operation by the manufacturer. The manufacturer shall revise, modify, adjust and reprogram the various components as required during and following start-up to provide proper operation.

3.5 ON-SITE OPERATION AND LOAD TEST

- A. After the manufacturer has inspected and verified the generation installation, the generator set shall be tested by the manufacturer. All components of the generator set shall be fully and completely operated and tested under simulated power failure conditions and at 1.00 power factor and under a full nameplate load for a period of at least two continuous hours. Load banks shall be provided by the manufacturer of the generator set as required to supplement the connected facility load and to provide full load conditions. Operating temperature, load amperes and voltage shall be recorded every half hour.
- B. The on-site operation testing shall take place in the presence of the Engineer. The Contractor shall inform the Engineer a minimum of 3 days prior to the testing taking place. All controls and functions of the generator shall be operable and all auxiliary equipment shall be connected and all field wiring complete before the testing is to take place.

3.6 OPERATION AND MAINTENANCE TRAINING

- A. The manufacturer of the generator set shall conduct specifically organized training sessions covering operation and maintenance of the unit for personnel employed by the Owner. The training sessions shall be conducted to educate and train the personnel in

the maintenance and operation of all components of the unit. Training shall include, but not be limited to, the follow:

1. Preventative maintenance procedures.
 2. Trouble-shooting
 3. Calibration
 4. Testing
 5. Replacement of components
 6. Automatic mode operation
 7. Manual mode operation
 8. Fuel and monitoring system
- B. At least one (1) training session, of at least (2) hours each in duration, shall be conducted at the site after start-up of the system. The manufacturer shall prepare and assemble specific instruction materials for each training session and shall supply such materials to the Owner at least two (2) weeks prior to the time of the training.

3.7 IDENTIFICATION

- A. Identify system components according to Section 16153 "Identification for Electrical Systems."
- B. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

3.8 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

3.10 FUEL SUPPLY

- A. Contractor shall pay the costs of all fuel used for testing and use during construction.

END OF SECTION

SECTION 16415
TRANSFER SWITCHES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes transfer switches rated 600 V and less, including the following:
 - 1. Automatic transfer switches (ATS).
 - 2. Manual transfer switches (MTS). Refer to Specification 16410: Enclosed Switches and Circuit Breakers.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
 - 1. Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.
- C. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:
 - 1. Features and operating sequences, both automatic and manual.
 - 2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.
- B. Source Limitations: Obtain automatic transfer switches through one source from a single manufacturer.

- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NEMA ICS 1.
- E. Comply with NFPA 70.
- F. Comply with NFPA 99.
- G. Comply with NFPA 110.
- H. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.5 PROJECT CONDITIONS

- A. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not exceeding 104 degrees F.
 - 2. Altitude: Not exceeding 6600 feet.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: two years from date of Substantial Completion.

1.7 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Contactor Transfer Switches:
 - a. AC Data Systems, Inc.
 - b. Caterpillar; Engine Div.
 - c. Emerson; ASCO Power Technologies, LP.
 - d. Generac Power Systems, Inc.

- e. GE Zenith Controls.
 - f. Kohler Power Systems; Generator Division.
 - g. Onan/Cummins Power Generation; Industrial Business Group.
 - h. Russelectric, Inc.
 - i. Spectrum Detroit Diesel.
2. Transfer Switches Using Molded-Case Switches or Circuit Breakers:
- a. AC Data Systems, Inc.
 - b. Eaton Electrical Inc.; Cutler-Hammer.
 - c. GE Zenith Controls.
 - d. Hubbell Industrial Controls, Inc.
 - e. Lake Shore Electric Corporation.

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
- B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
 - 1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
- C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 degrees C.
- D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- E. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.
- F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
 - 1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
 - 2. Switch Action: Double throw; mechanically held in both directions.

- 3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.
- G. Neutral Switching. Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles overlapping neutral contacts.
- H. Neutral Terminal: Solid and fully rated, unless otherwise indicated.
- I. Oversize Neutral: Ampacity and switch rating of neutral path through units indicated for oversize neutral shall be double the nominal rating of circuit in which switch is installed.
- J. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.
- K. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Division 16 Section "Electrical Identification."
 - 1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
 - 2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
 - 3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
- L. Enclosures: General-purpose NEMA 250, Type 12, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.3 AUTOMATIC TRANSFER SWITCHES

- A. Comply with Level 1 equipment according to NFPA 110.
- B. Switching Arrangement: Double-throw type, capable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.
- C. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.
- D. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.
- E. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.

- F. Programmed Neutral Switch Position: Switch operator has a programmed neutral position arranged to provide a midpoint between the two working switch positions, with an intentional, time-controlled pause at midpoint during transfer. Pause is adjustable from 0.5 to 30 seconds minimum and factory set for 0.5 second, unless otherwise indicated. Time delay occurs for both transfer directions. Pause is disabled unless both sources are live.
- G. Automatic Transfer-Switch Features:
1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
 2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
 3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
 4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
 5. Test Switch: Simulate normal-source failure.
 6. Switch-Position Pilot Lights: Indicate source to which load is connected.
 7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
 - a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
 - b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
 8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
 9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
 10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
 11. Engine Shutdown Contacts: Instantaneous; shall initiate shutdown sequence at remote engine-generator controls after retransfer of load to normal source.

12. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
13. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
 - a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
 - b. Push-button programming control with digital display of settings.
 - c. Integral battery operation of time switch when normal control power is not available.

2.4 SOURCE QUALITY CONTROL

- A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Design each fastener and support to carry load indicated by seismic requirements.
- B. Floor-Mounting Switch: Anchor to floor by bolting.
 1. Concrete Bases: 4 inches high, reinforced, with chamfered edges. Extend base no more than 4 inches in all directions beyond the maximum dimensions of switch, unless otherwise indicated or unless required for seismic support.
- C. Annunciator and Control Panel Mounting: Flush in wall, unless otherwise indicated.
- D. Identify components according to Division 16 Section "Electrical Identification."
- E. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.2 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

- B. Ground equipment according to Division 16 Section "Grounding and Bonding."
- C. Connect wiring according to Division 16 Section "Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installation, including connections, and to assist in testing.
 - 2. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
 - 3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
 - a. Check for electrical continuity of circuits and for short circuits.
 - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - c. Verify that manual transfer warnings are properly placed.
 - d. Perform manual transfer operation.
 - 5. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.

- f. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
 - 6. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
 - a. Verify grounding connections and locations and ratings of sensors.
- C. Coordinate tests with tests of generator and run them concurrently.
- D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- E. Remove and replace malfunctioning units and retest as specified above.
- F. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.
 - 1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.
 - 2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - 3. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below. Refer to Division 1 Section "Demonstration and Training."
- B. Coordinate this training with that for generator equipment.
- C. Test configured transfer switch alarms including:
 - 1. ATS in normal position
 - 2. ATS in Emergency position
 - 3. Normal power available
 - 4. Emergency Power available

END OF SECTION

SECTION 16416 PANELBOARDS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 16483 "Surge Protection for Low-Voltage Electrical Power Circuits"

1.2 SUMMARY

- A. Section Includes:
 - 1. Distribution panelboards.
 - 2. Lighting and appliance branch-circuit panelboards.
 - 3. Load centers.
 - 4. Electronic-grade panelboards.

1.3 DEFINITIONS

- A. ATS: Acceptance testing specification.
- B. GFCI: Ground-fault circuit interrupter.
- C. GFEP: Ground-fault equipment protection.
- D. HID: High-intensity discharge.
- E. MCCB: Molded-case circuit breaker.
- F. SPD: Surge protective device.
- G. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard.
 - 1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.

2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 1. Include dimensioned plans, elevations, sections, and details.
 2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
 3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
 4. Detail bus configuration, current, and voltage ratings.
 5. Short-circuit current rating of panelboards and overcurrent protective devices.
 6. Include evidence of NRTL listing for series rating of installed devices.
 7. Include evidence of NRTL listing for SPD as installed in panelboard for factory-mounted SPDs.
 8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 9. Include wiring diagrams for power, signal, and control wiring.
 10. Key interlock scheme drawing and sequence of operations.
 11. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit in PDF format; include selectable ranges for each type of overcurrent protective device.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01730 "Installation, Operation, and Maintenance Manuals," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Keys: Two spares for each type of panelboard cabinet lock.
 2. Circuit Breakers Including GFCI and GFEP Types: Two spares for each panelboard.
 3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: ISO 9001 or ISO 9002 certified.
- B. Obtain panelboards, overcurrent protective devices, components and accessories from single source from single manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.10 FIELD CONDITIONS

- A. Environmental Limitations:
 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

- a. Ambient Temperature: Not exceeding minus 22 deg F to plus 104 deg F.
- b. Altitude: Not exceeding 3300 feet.

1.11 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

- 1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 16148 "Seismic Controls for Electrical Systems."
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with NEMA PB 1.
- E. Comply with NFPA 70.
- F. Enclosures:
 - 1. Standalone Units: Flush and Surface-mounted, dead-front cabinets.
 - 2. MCC Units: Reference specification Section "16419" for enclosure requirements of panelboard units installed in MCCs.
 - 3. Rated for environmental conditions at installed location.
 - a. General Purpose Areas: NEMA 250, Type 1.
 - b. Indoor Wet and/or Damp Areas: NEMA 250, Type 12/3R.
 - c. Outdoor Areas: NEMA 250, Type 12/3R.
 - d. Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
 - e. Corrosive Areas: NEMA 250, Type 4X, stainless steel.

- f. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 4.
- 4. Height: 84 inches maximum.
- 5. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
- 6. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
- 7. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
- 8. Finishes:
 - a. Panels and Trim: Galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Same finish as panels and trim.
 - c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
- G. Incoming Mains:
 - 1. Location: Top and bottom.
 - 2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.
- H. Phase, Neutral, and Ground Buses:
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - a. Plating shall run entire length of bus.
 - b. Bus shall be fully rated the entire length.
 - 2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
 - 3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

4. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
 5. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.
 6. Extra-Capacity Neutral Bus (where indicated on the drawings): Neutral bus rated 200 percent of phase bus and listed and labeled by an NRTL acceptable to authority having jurisdiction, as suitable for nonlinear loads. Connectors shall be sized for double-sized or parallel conductors as indicated on Drawings. Do not mount neutral bus in gutter.
 7. Split Bus: Vertical buses divided into individual vertical sections.
- I. Conductor Connectors: Suitable for use with conductor material and sizes.
1. Material: Hard-drawn copper, 98 percent conductivity.
 2. Terminations shall allow use of 75 deg C rated conductors without derating.
 3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
 4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
 5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
 6. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 7. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 8. Gutter-Tap Lugs: Mechanical type suitable for use with conductor material and with matching insulating covers. Locate at same end of bus as incoming lugs or main device.
 9. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.
- J. NRTL Label: Panelboards or load centers shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices.

- K. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

- 1. Percentage of Future Space Capacity: 5 percent.

- L. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

- 1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.

- 2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

- 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

- B. Surge Suppression: Factory installed as an integral part or nipple-mounted and complying with Section 16483 "Surge Protection for Low-Voltage Electrical Power Circuits".

2.3 PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- 1. Eaton.

- 2. General Electric Company; GE Energy Management - Electrical Distribution.

- 3. Siemens Industry, Inc., Energy Management Division.

- 4. Square D; by Schneider Electric.

- B. Panelboards: NEMA PB 1, distribution type.

- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.
- D. Mains: Circuit breaker or lugs only as indicated.
- E. Branch Overcurrent Protective Devices: Bolt-on circuit breakers.

2.4 LOAD CENTERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. Eaton.
 2. General Electric Company; GE Energy Management - Electrical Distribution.
 3. Siemens Industry, Inc., Energy Management Division.
 4. Square D; by Schneider Electric.
- B. Load Centers: Comply with UL 67.
- C. Mains: Circuit breaker or lugs only as indicated.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Concealed hinges secured with flush latch with tumbler lock; keyed alike.
- F. Conductor Connectors: Mechanical type for main, neutral, and ground lugs and buses.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. Eaton.
 2. General Electric Company; GE Energy Management - Electrical Distribution.
 3. Siemens Industry, Inc., Energy Management Division.
 4. Square D; by Schneider Electric.
- B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.
 1. Thermal-Magnetic Circuit Breakers:

- a. Inverse time-current element for low-level overloads.
 - b. Instantaneous magnetic trip element for short circuits.
 - c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- 3. Electronic Trip Circuit Breakers:
 - a. RMS sensing.
 - b. Field-replaceable rating plug or electronic trip.
 - c. Digital display of settings, trip targets, and indicated metering displays.
 - d. Multi-button keypad to access programmable functions and monitored data.
 - e. Ten-event, trip-history log. Each trip event shall be recorded with type, phase, and magnitude of fault that caused the trip.
 - f. Integral test jack for connection to portable test set or laptop computer.
 - g. Field-Adjustable Settings:
 - 1) Instantaneous trip.
 - 2) Long- and short-time pickup levels.
 - 3) Long- and short-time adjustments.
 - 4) Ground-fault pickup level, time delay, and $I^2 T$ response.
- 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
- 5. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
- 6. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
- 7. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
- 8. Subfeed Circuit Breakers: Vertically mounted.

9. MCCB Features and Accessories:
- a. Standard frame sizes, trip ratings, and number of poles.
 - b. Breaker handle indicates tripped status.
 - c. UL listed for reverse connection without restrictive line or load ratings.
 - d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - e. Where indicated on the drawings:
 - 1) Ground-Fault Protection: Integrally mounted or remote-mounted as required, relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 - 2) Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
 - 3) Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.
 - 4) Rating Plugs: Three-pole breakers with ampere ratings greater than 150 amperes shall have interchangeable rating plugs or electronic adjustable trip units.
 - 5) Auxiliary Contacts: One, SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
 - 6) Alarm Switch: Single-pole, normally open contact that actuates only when circuit breaker trips.
 - 7) Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
 - 8) Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function with other upstream or downstream devices.
 - 9) Multipole units enclosed in a single housing with a single handle.
 - 10) Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.

- 11) Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.6 IDENTIFICATION

- A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
- B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
- C. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.
 1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

2.7 ACCESSORY COMPONENTS AND FEATURES

- A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
- B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.
- B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.
- D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and

other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

- B. Install panelboards and accessories according to NEMA PB 1.1.
- C. Equipment Mounting:
 - 1. Install floor-mounted panelboards on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 03300 "Cast-in-Place Concrete."
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
 - b. For panelboards, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to panelboards.
 - e. Attach panelboard to the vertical finished or structural service behind the panelboard.
 - 2. Attach panelboard to the vertical finished or structural surface behind the panelboard.
 - 3. Comply with requirements for seismic control devices specified in Section 16148 "Seismic Controls for Electrical Systems."
- D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- E. Comply with mounting and anchoring requirements specified in Section 16148 "Seismic Controls for Electrical Systems."
- F. Mount panelboards and load centers so that the operating handle of the highest overcurrent protection device is no higher than 6'7" above finished floor unless provided with provisions for operating from the floor.
 - 1. Care shall be taken to ensure that panelboards and load centers are mounted at heights convenient for Operator's use. Panelboards and load centers shall not be mounted with the bottom of the trim below 3' above finished floor unless

doing so would place the operating handle of the highest overcurrent protection device above 6'7" above finished floor.

- G. Mount panelboard cabinet plumb and rigid without distortion of box.
- H. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- I. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth. Orient steel slotted supports vertically.
- J. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
 - 2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.
- K. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
- L. Install filler plates in unused spaces.
- M. For flush-mounted panelboards, stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
- N. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 16153 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 16153 "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 16153 "Identification for Electrical Systems."

- E. Install warning signs complying with requirements in Section 16153 "Identification for Electrical Systems" identifying source of remote circuit.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections as specified in section 16670 "Electrical Testing."

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as specified in Section 16675 "Coordination Studies."
- C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Architect of effect on phase color coding.
 - 1. Measure loads during period of normal facility operations.
 - 2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by the Engineer. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
 - 3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
 - 4. Tolerance: Maximum difference between phase loads, within a panelboard, shall not exceed 20 percent.

3.6 PROTECTION

- A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION

SECTION 16419
MOTOR-CONTROL CENTERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes MCCs for use with ac circuits rated 600 V and less, with combination controllers and having the following factory-installed components:
 - 1. Automatic power transfer.
 - 2. Feeder-tap units.
 - 3. Measurement and control.
 - 4. Auxiliary devices.
 - 5. Panelboards.
 - 6. Transformers.
- B. The Electrical Control System Integrator (CSI, see Section 16928) shall be responsible for furnishing of the Motor Control Center including all related equipment as shown on the drawings and as specified herein. The Electrical Contractor shall be responsible for installing the Motor Control Center, interconnecting wiring and all related equipment per CSI's design.

1.3 DEFINITIONS

- A. CE: Conformance Europeene (European Compliance).
- B. CPT: Control power transformer.
- C. CSI: Control System Integrator.
- D. EMI: Electromagnetic interference.
- E. GFCI: Ground fault circuit interrupting.
- F. IGBT: Insulated-gate bipolar transistor.

- G. LAN: Local area network.
- H. LED: Light-emitting diode.
- I. MCC: Motor-control center.
- J. MCCB: Molded-case circuit breaker.
- K. MCP: Motor-circuit protector.
- L. OCPD: Overcurrent protective device.
- M. PCC: Point of common coupling.
- N. PID: Control action; proportional plus integral plus derivative.
- O. PT: Potential transformer.
- P. PWM: Pulse-width modulated.
- Q. RFI: Radio-frequency interference.
- R. SPD: Surge protective device.
- S. SCR: Silicon-controlled rectifier.
- T. TDD: Total demand (harmonic current) distortion.
- U. THD(V): Total harmonic voltage demand.
- V. VFC: Variable-frequency controller.
- W. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.4 ACTION SUBMITTALS

- A. In accordance with the submittal requirements of Section 16012 and 16928, the CSI shall work with the MCC manufacturer to develop and submit to the Engineer, through the Contractor, the following project data:
 - 1. Itemized list of all MCC features and components.
 - 2. List of all nameplates on the MCC units.
 - 3. System wiring diagrams for each unit in the entire motor control center including, but not limited to: all instruments, relays, starters, switches, lights, breakers, terminals, etc. Indicate on submitted diagrams in the contract

drawings. Wire and terminal numbers shall be included on the schematic diagrams. Relay contacts shall be indicated for type and number available for each relay used.

4. Information on ratings and sizes of all equipment such as control transformers, breakers, etc. on the wiring diagrams for each unit.
5. Shop drawings shall be provided on 11" x 17" sheets maximum size and shall be scaled using standard engineering or architectural scales.
 - a. The shop drawings shall be identified by the submittal number, revision number and submittal date.
 - b. The MCC shop drawings shall be submitted concurrently with the Control System Integrator Drawings. Refer to specification Section 16928.
6. Connection diagrams showing physical wiring layout for each unit.
7. Technical data sheets for all components with the complete part number of the component clearly designated with all required options as specified in PART 2. Provide at a minimum one tab section for each product listed in PART 2 of this section.
8. Scaled elevation drawings of the entire motor control center (including switchboards and transfer switches) exterior and interior with all devices clearly labeled.
9. Scaled arrangement drawings of all panel front- and internal-mounted instruments, switches, devices and equipment indicated. Show all mounting details required. Deviations from approved arrangements require resubmittal and approval prior to installation.
10. Bill of materials showing quantity, manufacturer, catalog number, and the supplier name and phone number for all components of the MCC.
11. Overload relay heater tables.
12. Shop drawing submittal shall contain submittal date and revision number on all shop drawing sheets.
13. All submitted Shop Drawings shall be reviewed, signed and dated prior to Engineer's review by:
 - a. General Contractor
 - b. Electrical Contractor

- c. Control System Integrator.
- B. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for MCCs.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories for each cell of the MCC.
- C. Shop Drawings: For each MCC, manufacturer's custom drawings as defined in UL 845. In addition to requirements specified in UL 845, include dimensioned plans, elevations, and sections; and conduit entry locations and sizes, mounting arrangements, and details, including required clearances and service space around equipment.
 - 1. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Each installed unit's type and details.
 - b. Factory-installed devices.
 - c. Enclosure types and details.
 - d. Nameplate legends.
 - e. Short-circuit current (withstand) rating of complete MCC, and for bus structure and each unit.
 - f. Features, characteristics, ratings, and factory settings of each installed controller and feeder device, and installed devices.
 - g. Specified optional features and accessories.
 - 2. Schematic and Connection Wiring Diagrams: For power, signal, and control wiring for each installed controller.
 - 3. Nameplate legends.
 - 4. Vertical and horizontal bus capacities.
 - 5. Features, characteristics, ratings, and factory settings of each installed unit.

1.5 INFORMATIONAL SUBMITTALS

- A. Standard Drawings: For each MCC, as defined in UL 845.
- B. Production Drawings: For each MCC, as defined in UL 845.

- C. Coordination Drawings: Floor plans, drawn to scale, showing dimensioned layout, required working clearances, and required area above and around MCCs where pipe and ducts are prohibited. Show MCC layout and relationships between electrical components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.
- D. Qualification Data: For testing agency.
- E. Seismic Qualification Data: Certificates, for MCCs, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- F. Product Certificates: For each MCC.
- G. Source quality-control reports.
- H. Field quality-control reports.
- I. Load-Current and Overload Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.
- J. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor running overload protection suit actual motors to be protected.
- K. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For MCCs, all installed devices, and components to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 01730 "Installation, Operation, and Maintenance Manuals," include the following:
 - 2. Manufacturer's Record Drawings: As defined in UL 845. In addition to requirements specified in UL 845, include field modifications and field-assigned wiring identification incorporated during construction by manufacturer, Contractor or both.

3. Manufacturer's written instructions for testing and adjusting circuit breaker and MCP trip settings.
4. Manufacturer's written instructions for setting field-adjustable overload relays.
5. Manufacturer's written instructions for testing, adjusting, and reprogramming reduced-voltage, solid-state controllers.
6. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
7. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 2. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
 3. Indicating Lights: Two of each type and color installed.
 4. Auxiliary Contacts: Furnish one spare(s) for each size and type of magnetic controller installed.
 5. Power Contacts: Furnish three spares for each size and type of magnetic contactor installed.
 6. FVNR Starter: Furnish one spare starter communication module.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA.
 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain MCCs and controllers of a single type from single source from single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled, as defined in NFPA 70, by a qualified testing agency and marked for intended use.

- D. UL Compliance: MCCs shall comply with UL 845 and shall be listed and labeled by a qualified testing agency.
- E. Comply with NFPA 70.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver MCCs in shipping splits of lengths that can be moved past obstructions in delivery paths.
- B. Motor control centers shall be constructed with shipping splits such that not more than two twenty-inch-wide sections are joined together without a shipping split.
- C. Provide shipping splits between any two sections which when joined together would create a section greater than 40" wide.
- D. Handle MCCs according to the following:
 - 1. NECA 402, "Recommended Practice for Installing and Maintaining Motor Control Centers."
 - 2. NEMA ICS 2.3, "Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers Rated Not More Than 600 Volts."
- E. If stored in space that is not permanently enclosed and air conditioned, remove loose packing and flammable materials from inside MCCs; install temporary electric heating, with at least 250 W per vertical section or connect factory-installed space heaters to temporary electrical service.

1.10 COORDINATION

- A. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases.
- B. Coordinate features of MCCs, installed units and accessory devices with remote pilot devices and control circuits to which they connect.
- C. Coordinate features, accessories and functions of each MCC, each controller and each installed unit with ratings and characteristics of supply circuits, motors, required control sequences and duty cycle of motors and loads.
- D. Control System:
 - 1. The motor control center manufacturer shall equip the assembly with all appurtenances and accessories (including, but not limited to, control relays, control contacts, control wiring and terminal strips) as required by the CSI for interface with the main control system to provide a totally integrated and operable system.

2. The CSI, as specified in Section 16928, shall be solely and completely responsible for coordination and integration of control system with the Motor Control Center. The CSI shall direct the MCC supplier to provide all intended details of the equipment which may influence or affect the control system. The CSI shall determine all requirements for and shall cause integration of the control system and the MCC into a unified operating system. The CSI will define all requirements for all interfacing equipment, appurtenances and accessories.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace MCC units including all manufacturer supplied MCC instrumentation and motor control devices including, but not limited to, VFCs, SPDs, Solid-State Starters, Manual Starters, Control Devices, and other related components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with project requirements, available manufacturers offering projects that may be incorporated into the Work include, but are not limited to, the following:

1. Allen Bradley, Rockwell Automation, Inc.
2. Eaton Corporation
3. Square D Company
4. Siemens

2.2 SYSTEM DESCRIPTION

- A. Fabricate and label MCCs to comply with NEMA ICS 18 and comply with UL 845.
- B. Ambient Environment Ratings:
 1. Ambient Temperature Rating: Not less than 0 deg F and not exceeding 104 deg F, with an average value not exceeding 95 deg F over a 24-hour period.
 2. Ambient Storage Temperature Rating: Not less than minus 4 deg F and not exceeding 140 deg F.
 3. Humidity Rating: Less than 95 percent (noncondensing).

4. Altitude Rating: Not exceeding 6600 feet, or 3300 feet if MCC includes solid-state devices.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for MCCs, including clearances between MCCs and adjacent surfaces and other items.

2.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: MCCs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
 2. Component Importance Factor: 1.5.
 3. Component Amplification Factor: 2.5.
 4. Component Response Modification Factor: 6.0.

2.4 MOTOR CONTROL CENTER ENCLOSURES

- A. Enclosures: Freestanding steel cabinets, minimum 14 gage with 20-inch wide by 20-inch deep by 90-inches high sections, unless otherwise indicated. NEMA 250, Type 1A unless otherwise indicated to comply with environmental conditions at installed location.
- B. Space Heaters: Factory-installed electric space heaters of sufficient wattage in each vertical section to maintain enclosure temperature above expected dew point.
1. Space-Heater Control: Thermostats to maintain temperature of each section above expected dew point.
 2. Space-Heater Power Source: 120-V external branch circuit.
- C. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.
- D. Outdoor Enclosures: Type 3R, non-walk-in aisle.
1. Finish: Factory-applied finish in manufacturer's standard gray color; undersurfaces treated with corrosion-resistant undercoating.
 2. Enclosure: Downward, rearward sloping roof; bolt-on rear covers for each section, with provisions for padlocking.
 3. Doors: Personnel door at each end of aisle, minimum width of 30 inches; opening outwards; with panic hardware and provisions for padlocking.

4. Accessories: LED luminaires, ceiling mounted; wired to a three-way light switch at each end of aisle; GFCI duplex receptacle; emergency battery pack luminaire installed on wall of aisle midway between personnel doors.
5. Power for Space Heaters, Ventilation, Lighting, and Receptacle: Include a CPT within the switchboard. Supply voltage shall be 120/208-V ac.
6. Power for space heaters, ventilation, lighting, and receptacle supplied from a remote source.

2.5 ASSEMBLY

A. Structure:

1. Comply with UL requirements for service entrance equipment where indicated on the drawings.
2. Units up to and including Size 3 shall have drawout mountings with connectors that automatically line up and connect with vertical-section buses while being racked into their normal, energized positions.
3. Units in Type B and Type C MCCs shall have pull-apart terminal strips for external control connections.
4. Pull Boxes:
 - a. Include provisions for ventilation to maintain temperature in pull box within same limits as the MCC.
 - b. Set the box back from front to clear circuit-breaker removal mechanism.
 - c. Covers: Removable covers forming top, front, and sides. Top covers at rear easily removable for drilling and cutting.
 - d. Insulated bottom of fire-resistive material with separate holes for cable drops into MCC.
 - e. Cable Supports: Arranged to facilitate cabling and adequate to support cables, including supports for future cables.
 - f. When equipped with isolation barriers, supply with access to check bus bolt tightness.
5. Front-Connected, Front-Accessible MCCs:
 - a. Main Devices: Fixed mounted.
 - b. Controller Units: Drawout and fixed mounted.

- c. Feeder-tap Units: Drawout and fixed mounted.
 - d. Sections front and rear aligned.
- B. Compartments: Modular; individual doors with concealed hinges and quick-captive screw fasteners.
 - 1. Interlock compartment door to require that the disconnecting means is "off" before door can be opened or closed, except by operating a concealed release device.
 - 2. Compartment construction shall allow for removal of units without opening adjacent doors, disconnecting adjacent compartments, or disturbing operation of other units in MCC.
 - 3. The same-size compartments shall be interchangeable to allow rearrangement of units, such as replacing three single units with a unit requiring three spaces, without cutting or welding.
- C. Arrangement:
 - 1. Motor control center sections shall have a minimum 72-inch working height to accommodate a minimum of six 12-inch compartments. Sections shall be 20 inches deep with a 90-inch height. Minimum width shall be 20 inches.
Contractor must determine that the assembled motor control center provided will fit in the area designated on the drawings. Compartments shall have pan-type doors with quarter turn hold-down latches and neoprene gaskets. Doors for compartments with starter and feeder tap units shall be mechanically interlocked with the unit's disconnecting device to prevent unintentional opening of the door while energized and unintentional application of power while the door is open.
 - 2. Starters and feeder tap units shall be draw-out plug-in construction with hardened, plated copper free-floating stabs, steel spring backups and interference tabs which prevent door closure if unit is improperly installed. Units shall be latched to assure proper bus contact.
 - 3. Floor sills and lifting means shall be provided.
- D. Bus Transition and Incoming Pull Sections: Included and aligned with the structure of the MCC.
- E. Wiring Spaces:
 - 1. Vertical wireways in each vertical section for vertical wiring to each unit compartment; supports to hold wiring in place.

2. Horizontal wireways in bottom and top of each vertical section for horizontal wiring between vertical sections; supports to hold wiring in place.
- F. Compartment Wiring/Terminals:
1. The motor control center shall be suitable for operation on 480Y/277 volts, four-wire, 60 hertz. Wiring shall be NEMA Class II, Type B. Each unit shall be completely prewired with all control wiring numbered and terminated on terminal strips. Terminal's numbering shall be coordinated between units such that like devices shall have the same terminal numbers. Wiring with one bucket shall be labeled with a basic wire numbering scheme. Field wiring or wiring between buckets shall conform to the requirements of Section 16119 and 16123.
 2. Provide a drawing pocket in each unit; provide an individual wiring diagram and arrangement diagram in each compartment/bucket.
 3. Provide a minimum of 5 spare terminals in each unit. No terminal strips are required for the load wiring except units with circuit breakers only – 30 amps and small shall have load wiring terminals. Auxiliary components such as HOA selector switches, indicating lights and other indicating and/or recording devices shall be mounted on the compartment door or cover. All control power leads into and out of each unit shall pass through auxiliary contacts of the circuit breaker or be equipped with their own disconnecting device or disconnecting terminal strips, appropriately labeled.
 4. See also requirements of Section 16119 and 16123.
- G. Wiring: NEMA ICS 18, Class I, Type B, for starters above Size 3, Type B-T, for starter Size 3 and below.
- H. Characteristics and Ratings:
1. Motor control centers shall be suitable for operation on the voltage, frequency and system type indicated on the drawings.
- I. Provisions for Future:
1. Compartments marked "future" shall be bused, wired and equipped with guide rails or equivalent, and ready for insertion of drawout units.
 2. Compartments marked "spare" shall include provisions for connection to the vertical bus.
- J. Integrated Short-Circuit Rating:
1. Short-Circuit Current Rating for Each Unit: Fully rated as indicated on the drawings.

2. Short-Circuit Current Rating of MCC: Fully rated with its main overcurrent device as indicated on the drawings.
- K. Control Power:
1. 120-V ac; obtained from CPT integral with controller; with primary and secondary fuses. The CPT shall be of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 - a. CPT Spare Capacity: 25% excess capacity.
 2. Primary and secondary fuses for current-limiting and overload protection of transformer and fuses for protection of control circuits.
- L. Factory-Installed Wiring: Factory installed, with bundling, lacing, and protection included. Use flexible conductors for No. 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.
1. Wiring Class: NEMA ICS 18, Class II, Type B, for starters larger than Size 3; Type B-T, for starters Size 3 and smaller.
 2. Control and Load Wiring: Factory installed, with bundling, lacing, and protection included. Use flexible conductors for No. 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.
- M. Bus:
1. Bus Ratings:
 - a. Main Bus Continuous Rating: As indicated on the drawings.
 - b. Vertical Bus Continuous Rating: Minimum 300A.
 - c. Neutral Bus Rating: 100 percent of the ampacity of the phase buses unless otherwise indicated.
 - d. Ground Bus: Minimum 300A.
 2. Horizontal and Vertical Bus Bracing (Short-Circuit Current Rating): Match MCC short-circuit current rating.
 3. Main Horizontal and Equipment Ground Buses: Uniform capacity for entire length of MCC's main and vertical sections. Provide for future extensions from both ends. Brace bus extensions for busway feeder bus.
 4. Vertical Phase and Equipment Ground Buses: Uniform capacity for entire usable height of vertical sections, except for sections incorporating single units.

5. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent minimum conductivity, tin-plated alloy, with mechanical connectors for outgoing conductors.
6. Neutral Bus Rating: 100 percent of the ampacity of phase buses unless otherwise indicated. Brace bus extensions for busway feeder neutral bus.
7. Ground Bus: Minimum 300 ampere, Hard-drawn copper of 98 percent minimum conductivity, with pressure connector for ground conductors, minimum size 1/4-by-2 inches. Equip with mechanical connectors for outgoing equipment ground conductors. For busway feeders, extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.
8. Neutral Disconnect Link: For service entrance rated units, bolted, uninsulated, 1/4-by-2-inch copper bus, arranged to connect neutral bus to ground bus.
9. Bus-Bar Insulation: Factory-applied, flame-retardant, tape wrapping of individual bus bars or flame-retardant, spray-applied insulation. Insulation temperature rating shall not be less than 105 deg C.

2.6 MAIN DISCONNECT AND OVERCURRENT PROTECTIVE DEVICE(S)

- A. MCCB: Fixed mounted, manually operated air-circuit breaker. Comply with UL 489.
 1. MCCB shall have quick-make, quick-break, over-center switching mechanism that is mechanically trip-free, its position shall be shown by the position of the handle, and manual push-to-trip push button.
 2. Breakers less than 250A: Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
 3. Breakers 250A and Larger: Solid-state monitoring and tripping system to show system status monitoring and adjustable time-current protection.
 - a. Interchangeable current sensors and timing circuits for adjustable time-current protection settings and status signals.
 - b. Trip-setting dials or interchangeable plugs to establish the continuous trip of the circuit breaker. Plugs shall not be interchangeable between frames, and the breaker may not be closed without the plug. With neutral ground-fault sensor.
 - c. Time-current adjustments to achieve protective-device coordination as follows:
 - 1) Adjustable long-time delay.

- 2) Adjustable short-time setting and delay to shape the time-current curve.
- 3) Adjustable instantaneous setting.
- 4) Individually adjustable ground-fault setting and time delay.
- d. Built-in connector to test the long-time delay, instantaneous, and ground-fault functions of the breaker. Provide one test set for testing the installed circuit breakers 225-A frame and higher.
- e. Built-in digital ammeter display, showing load current and tripping cause.
- 4. Switch operator power shall be from control power specified in "Assembly" Article.
- 5. MCCB Features and Accessories:
 - a. Standard frame sizes, trip ratings and number of poles.
 - b. Mechanical style lugs, suitable for number, size, trip rating and conductor material.
 - c. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
- B. MCCB (1600 to 2500 A): Fixed mounted, manually operated air-circuit breaker. Comply with UL 489.
 - 1. MCCB shall have quick-make, quick-break, over-center switching mechanism that is mechanically trip-free, its position shall be indicated by the position of the handle, and manual push-to-trip push button.
 - 2. Solid-state monitoring and tripping system to show system status monitoring, adjustable time-current protection, and shunt trip.
 - a. Interchangeable current sensors and timing circuits for adjustable time-current protection settings and status signals.
 - b. LED indicators or display, with manual reset, to show reasons of automatic trip.
 - c. Display panel to indicate the status of the system circuitry or give fault location based on automatic diagnosis.
 - d. Trip the circuit breaker when closing on a fault.

- e. Time-current adjustments to achieve protective-device coordination as follows:
 - 1) Adjustable long-delay pickup and time.
 - 2) Individual adjustments for short-delay pickup, time, and I-squared-t setting.
 - 3) Adjustable instantaneous pickup.
 - 4) Individually adjustable ground-fault pickup and time, with I-squared-t setting.
 - f. One test kit to test each trip function.
 - g. Battery backup for informational displays after automatic trip, with battery status indicator.
- C. Surge Suppression: Factory installed as an integral part of the incoming feeder, complying with specification section 16483 "Surge Protection for Low-Voltage Electrical Power Circuits."

2.7 MAGNETIC CONTROLLERS

- A. Reference specification Section 16444 "Manual and Magnetic Motor Controllers".
- B. Controller Units: Combination controllers.
- C. Controllers: Comply with UL 508.

2.8 VFC

- A. Reference specification Section 16453 "Variable-Frequency Motor Controllers".
- B. Controller Units: Combination controllers, consisting of variable-frequency power converter that is factory packaged in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged for self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency. Comply with NEMA ICS 7, NEMA ICS 61800-2, UL 508C, and UL 508E for bypass contactors.

2.9 CONTROLLER-MOUNTED AUXILIARY DEVICES

- A. Control-Circuit and Pilot Devices: Factory installed in controller enclosure cover unless otherwise indicated. Comply with NEMA ICS 5.
 - 1. Push Buttons, Pilot Lights, and Selector Switches: Heavy-duty, oiltight type.

- a. Push Buttons: Recessed types; momentary contact unless otherwise indicated.
 - b. Pilot Lights: LED Transformer types; push to test.
 - c. Selector Switches: Rotary type.
- B. Elapsed-Time Meters: Heavy duty with digital readout in hours; non-resettable.
- C. Meters: Panel type, 2-1/2-inch minimum size with 90- or 120-degree scale and plus or minus 2 percent accuracy, with selector switches having an off position.
- D. Auxiliary Dry Contacts: Reversible NC/NO.
- E. Control Relays:
 - 1. Time Delay: Auxiliary and adjustable solid-state time-delay relays.
 - 2. General Purpose: Relays for general purpose use shall be DPDT or 3PDT, 10A contacts with the appropriate coil voltage for the application. They shall have an 8-pin base, matching socket, and contact status indicator.
 - 3. Terminal Blocks: Terminals shall be 300 or 600 volt modular terminal blocks with tubular screw and pressure plate. Terminal shall be sized to accept #2-#14 wire minimum. Provide a minimum of 20% or four (whichever is more) spare terminals in each bucket. Allen-Bradley Bulletin 1492-CA1 or approved equal.

2.10 MEASUREMENT AND CONTROL DEVICES

- A. Instrument Transformers: IEEE C57.13, NEMA EI 21.1, and the following:
 - 1. PTs: IEEE C57.13; 120 V, 60 Hz, tapped secondary; disconnecting type with integral fuse mountings. Burden and accuracy shall be consistent with connected metering and relay devices.
 - 2. Current Transformers: IEEE C57.13; 5 A, 60 Hz, secondary; bar or window type; double secondary winding and secondary shorting device. Burden and accuracy shall be consistent with connected metering and relay devices.
 - 3. CPTs: Dry type, mounted in separate compartments for units larger than 3 kVA.
 - 4. Current Transformers for Neutral and Ground-Fault Current Sensing: Connect secondary wiring to ground overcurrent relays, via shorting terminals, for selective tripping of main and tie circuit breaker. Coordinate with feeder circuit-breaker and ground-fault protection.
- B. Digital Power Meters: Reference specification Section 16679 "Electrical Power Monitoring and Control".

2.11 FEEDER TAP UNITS

- A. MCCBs (to 1200 A): Fixed mounted, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Comply with UL 489, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
 - 1. Breakers less than 200A: Thermal-Magnetic Circuit Breakers. Inverse time current element for low-level overloads and instantaneous magnetic trip element for short circuits with the following field-adjustable settings:
 - a. Instantaneous Trip
 - 2. Breakers 200A and larger: Electronic Trip Circuit Breakers. Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.
 - 3. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
 - 4. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
 - 5. Alarm Switch: One NC contact that operates only when circuit breaker has tripped.
 - 6. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
 - 7. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
 - 8. Electrical Operator: Remote control for on, off, and reset operations.
- B. Fusible Switches (to 600 A): Fixed-mounted, manually operated, fusible, quick-make, quick-break switch with 200-kA interrupting and short-circuit current rating when fitted with UL 248-8 Class J fuses. Comply with UL 98.
 - 1. Indication whether the switch is open or closed, and provisions for padlocking the operating handle.

2. Include fuse clips and fuses.
3. Electrically tripped switches shall include the following:
 - a. Shunt trip.
 - b. Ground-fault protection, with adjustable time delay and test panel.
 - c. Single-phase protection, tripping the switch on loss of a source phase.
 - d. Blown fuse protection, tripping the switch on a blown fuse, with blown fuse indication.

2.12 PANELBOARDS

- A. Reference specification Section "16416" for panelboard requirements.

2.13 TRANSFORMERS

- A. Reference specification Section "16213" for transformer requirements.

2.14 SOURCE QUALITY CONTROL

- A. MCC Testing: Test and inspect MCCs according to requirements in NEMA ICS 18.
- B. VFC Testing: Test and inspect VFCs according to requirements in NEMA ICS 61800-2.
 1. Test each VFC while connected to its specified motor.
 2. Verification of Performance: Rate VFCs according to operation of functions and features specified.
- C. MCCs will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 EXECUTION

3.1 GENERAL

- A. It is the Contractors responsibility to verify that the motor starters, protection equipment and other components provided are suitable (correct phase, voltage, starter type, correct breakers, and overload relays) for the motors and equipment loads being served.
- B. Operator interface devices such as metering devices and devices with controls and displays shall be installed between 5' and 5'-8" above finished floor. Operator interface

devices on full height sections shall be installed between 4'6" and 6' above finished floor.

- C. All assembly and wiring not completed by the manufacturer or Integrator due to shipping sections, multiple suppliers, etc. shall be the responsibility of the Contractor.
- D. Provide wire and terminal numbering on all wires and terminals.
- E. Provide schematic and layout drawings for each individual unit.

3.2 FACTORY ACCEPTANCE TESTING

- A. Motor control equipment shall be tested in the CSI's shop along with the control system per the requirements in this Section 16419 "Motor-Control Centers" and 16928 "Control System". Operation of the motor control equipment shall be tested in the shop by the Control System Integrator. The testing shall include, but not be limited to, operation of all input and output (I/O) points, control devices and motor controllers 24 hours per day for a continuous period of at least one (1) week.
- B. Testing and inspection of motor control equipment shall include all components. All motor controllers shall be interconnected with the control system and powered with rated incoming voltage.
- C. After completion of initial testing, the CSI shall conduct subsequent testing for inspection by the Engineer. The CSI shall provide for time, equipment and support in their shop for the Engineer to test the motor control equipment for a period of up to 3 days. All control functions and all status and alarm monitoring and indication shall be demonstrated under simulated operating conditions. Simulating equipment shall be provided and wired into the motor control equipment for this testing. The CSI shall revise, modify and adjust the motor control equipment as required by the Engineer during the testing period.
- D. Once all changes and modifications required by the Engineer identified during the testing are made and the corrective action taken is to the satisfaction of the Engineer, motor control equipment may be released for delivery to the site upon receiving approval from the Engineer.

3.3 EXAMINATION

- A. Examine areas and surfaces to receive MCCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.
- B. Examine enclosed controllers before installation. Reject enclosed controllers that are wet, moisture damaged or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 INSTALLATION

- A. NEMA Industrial Control and Systems Standards: Comply with parts of NEMA ICS 2.3 for installation and startup of MCCs.
- B. Motor control center equipment shall not be shipped to the site until it has been inspected and tested to the satisfaction of the Engineer (see Section 16928 for requirements) and a suitable environment is available for installation of the equipment. A suitable environment for the purposes of this contract for the motor control center shall be dry, covered and heated to maintain a minimum ambient temperature of 60 degrees F. Prior to shipment of electrical equipment, the Contractor shall contact the Engineer for field verification of a suitable environment.
- C. The motor control center shall be installed in accordance with the installation drawings and instructions. Installation shall be performed by workers who are skilled and experienced in the installation of motor control equipment. It is the contractor's responsibility to provide sufficient space for the equipment and size of equipment to fit within the space requirements and meet all code requirements.
- D. Installation shall include all elements and components of motor control equipment and all conduit and interconnecting wiring between all elements, components, and sensors. All wiring between cabinets, sensors, pumps and equipment shall be multiple color coded with at least twenty individual colors for ease of servicing. All terminations shall be made with solderless pressure connectors. All wiring shall be in accordance with the requirements of Section 16119 and 16123, Intrinsically safe wiring shall be separated with barriers per NEC requirements.
- E. Coordinate layout and installation of MFCCs with other construction including conduit, piping, equipment and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- F. Floor Mounting: Install MCCs on 4-inch nominal-thickness concrete base. Comply with requirements for concrete base specified in Section 03300 "Cast-in-Place Concrete."
 - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.

- G. Seismic Bracing: Comply with requirements specified in Section 16148 "Seismic Controls for Electrical Systems."
- H. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- I. Install fuses in each fusible switch.
- J. Install fuses in control circuits if not factory installed.
- K. Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.
- L. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
- M. Install power factor correction capacitors. Connect to the load side of overload relays. If connected to the load side of overload relays, adjust overload heater sizes to accommodate the reduced motor full-load currents.
- N. Comply with NECA 1.

3.5 IDENTIFICATION

- A. Comply with requirements in Section 16153 "Identification for Electrical Systems" for identification of MCC, MCC components, and control wiring.
 - 1. Identify field-installed conductors, interconnecting wiring, and components.
 - 2. Install required warning signs.
 - 3. Label MCC and each cubicle with engraved nameplate.
 - 4. Label each enclosure-mounted control and pilot device.
 - 5. Mark up a set of manufacturer's connection wiring diagrams with field-assigned wiring identifications and return to manufacturer for inclusion in Record Drawings.
- B. Operating Instructions: Frame printed operating instructions for MCCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of MCCs.

3.6 CONTROL WIRING INSTALLATION

- A. Install wiring between enclosed controllers, master terminal boards and remote devices and facility's central-control system. Comply with requirements in Section 16123 "Control-Voltage Electrical Power Cables."

- B. Bundle, train, and support wiring in enclosures. Maintain a minimum of 1-inch separation between conductors of different voltages.
- C. Connect selector switches and other automatic-control selection devices where applicable.
 - 1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
 - 2. Connect selector switches within enclosed controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.7 CONNECTIONS

- A. Comply with requirements for installation of conduit in Section 16133 "Raceways and Boxes for Electrical Systems." Drawings indicate general arrangement of conduit, fittings, and specialties.
- B. Comply with requirements in Section 16126 "Grounding and Bonding for Electrical Systems."

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections as specified in Section 16670 "Electrical Testing."

3.9 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to NETA Acceptance Testing Specification and manufacturer's written instructions.

3.10 ADJUSTING

- A. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload relay pickup and trip ranges.
- B. Adjust overload relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.
- C. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to six times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Engineer before increasing settings.

- D. Set field-adjustable switches and program microprocessors for required start and stop sequences in reduced-voltage, solid-state controllers.
- E. Program microprocessors in VFCs for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.
- F. Set field-adjustable circuit-breaker trip ranges as specified in Section 16675 "Coordination Studies."

3.11 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers, and to use and reprogram microprocessor-based, reduced-voltage, solid-state controllers.

END OF SECTION

SECTION 16426 WIRING DEVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Standard-grade receptacles.
 - 2. USB receptacles.
 - 3. GFCI receptacles.
 - 4. SPD receptacles.
 - 5. Hazardous (classified) location receptacles.
 - 6. Twist-locking receptacles.
 - 7. Pendant cord-connector devices.
 - 8. Cord and plug sets.
 - 9. Toggle switches.
 - 10. Occupancy sensors.
 - 11. Digital timer light switches.
 - 12. Residential devices.
 - 13. Wall-box dimmers.
 - 14. Wall plates.

1.3 DEFINITIONS

- A. AFCI: Arc-fault circuit interrupter.
- B. BAS: Building automation system.

- C. EMI: Electromagnetic interference.
- D. GFCI: Ground-fault circuit interrupter.
- E. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- F. RFI: Radio-frequency interference.
- G. SPD: Surge protective device.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Service/Power Poles: One for every 10, but no fewer than one.
 - 2. Floor Service-Outlet Assemblies: One for every 10, but no fewer than one.
 - 3. Poke-Through, Fire-Rated Closure Plugs: One for every five floor service outlets installed, but no fewer than two.
 - 4. SPD Receptacles: One for every 10 of each type installed, but no fewer than two of each type.

PART 2 PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

- B. Comply with NFPA 70.
- C. RoHS compliant.
- D. Comply with NEMA WD 1.
- E. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with requirements in this Section.
- F. Devices for Owner-Furnished Equipment:
 - 1. Receptacles: Match plug configurations.
 - 2. Cord and Plug Sets: Match equipment requirements.
- G. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: white unless otherwise indicated or required by NFPA 70 or device listing.
 - 2. Wiring Devices Connected to Essential Electrical System: Red.
 - 3. SPD Devices: Blue.
 - 4. Isolated-Ground Receptacles: Orange.
- H. Wall Plate Color: For plastic covers, match device color.
- I. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STANDARD-GRADE RECEPTACLES

- A. Duplex Receptacles, 125 V, 20 A:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Eaton (Arrow Hart).
 - b. Hubbell Incorporated (Commercial and Industrial Group - Wiring Device-Kellems).

- c. Leviton Manufacturing Co., Inc.
 - d. Pass & Seymour/Legrand (Pass & Seymour).
- 2. Description: Two pole, three wire, and self-grounding.
- 3. Configuration: NEMA WD 6, Configuration 5-20R.
- 4. Standards: Comply with UL 498 and FS W-C-596.
- B. Isolated-Ground Duplex Receptacles, 125 V, 20 A:
 - 1. Description: Straight blade; equipment grounding contacts shall be connected only to green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts. Two pole, three wire, and self-grounding.
 - 2. Configuration: NEMA WD 6, Configuration 5-20R.
 - 3. Standards: Comply with UL 498 and FS W-C-596.
- C. Tamper-Resistant Duplex Receptacles, 125 V, 20 A:
 - 1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
 - 2. Configuration: NEMA WD 6, Configuration 5-20R.
 - 3. Standards: Comply with UL 498 and FS W-C-596.
 - 4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.
- D. Weather-Resistant Duplex Receptacle, 125 V, 20 A:
 - 1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
 - 2. Configuration: NEMA WD 6, Configuration 5-20R.
 - 3. Standards: Comply with UL 498.
 - 4. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.
- E. Tamper- and Weather-Resistant Duplex Receptacles, 125 V, 20 A:

1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498.
4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

2.3 GFCI RECEPTACLES, 125 V, 20 A

A. Duplex GFCI Receptacles, 125 V, 20 A:

1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Type: Feed through.
4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

2.4 HAZARDOUS (CLASSIFIED) LOCATION RECEPTACLES

A. Hazardous (Classified) Locations Receptacles:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Cooper Crouse-Hinds.
 - b. EGS/Appleton Electric.
 - c. Hubbell Incorporated (Construction and Energy Group).
2. Description: Hazardous location receptacles shall be simplex delayed action circuit breaking type with spring door. Receptacles shall be rated at 125V, 20A, NEMA 5-20R.
 - a. Furnish one matching 20A hazardous location plug to the Owner for each receptacle, NEMA 5-20P.
3. All hazardous location receptacles shall be rated for the environment in which they are installed. Reference hazardous area classification plan on the drawings for additional information.

4. Standards: Comply with NEMA FB 11 and UL 1203.

2.5 MELTRIC RECEPTACLES

- A. Description: Outdoor rated special purpose receptacles with integral load breaking mechanism to ensure load is broken before the plug is removed from the receptacle.
- B. General Requirements:
 1. Each receptacle shall be furnished with a matching plug and receptacle with voltage rating, amperage rating and pole configuration as indicated on the drawings.
 2. Constant pressure butt-contacts. Pin and sleeve contacts are not permitted.
 3. Receptacles must have keyed system to discriminate between circuits or incompatible operating voltages or frequencies.
 4. UV Resistant.
- C. General Purpose:
 1. Plug and receptacle terminals must be spring assisted to prevent loosening due to conductor yielding, shocks, vibrations or thermal cycling.
 2. NEMA 3R minimum environmental protection rating.
 3. Meltric DR Series or approved equal.
- D. Hazardous Location:
 1. Receptacle shall be listed for Class 1, Division 2, Groups A, B, C and D.
 2. Receptacles shall be able to safely connect and disconnect equipment under full load in potentially hazardous and explosive environments.
 3. IP 66+67 minimum environmental protection rating.
 4. Meltric DSN/DS Series or approved equal.
- E. Accessories:
 1. Handles: Poly with cord grip and strain relief mesh, size as required.
 2. Wall Box:
 - a. General Purpose: 70-degree poly angle with aluminum box and NPT.

b. Hazardous Location: 30-degree metal angle with metal box and NPT.

3. Pawl: Padlock pawl unless otherwise indicated.

2.6 TWIST-LOCKING RECEPTACLES

A. Twist-Lock, Single Receptacles, 120 V, 20 A:

1. Configuration: NEMA WD 6, Configuration L5-20R.

2. Standards: Comply with UL 498.

B. Twist-Lock, Single Receptacles, 250 V, 20 A:

1. Configuration: NEMA WD 6, Configuration L6-20R.

2. Standards: Comply with UL 498.

3. Twist-Lock, Single Receptacles, 277 V, 20 A:

4. Configuration: NEMA WD 6, Configuration L7-20R.

5. Standards: Comply with UL 498.

C. Twist-Lock, Isolated-Ground, Single Receptacles, 125 V, 20 A:

1. Grounding: Equipment grounding contacts shall be connected only to green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2. Configuration: NEMA WD 6, Configuration L5-20R.

3. Standards: Comply with UL 498.

2.7 PENDANT CORD-CONNECTOR DEVICES

A. Description: Matching, locking-type plug and receptacle body connector, heavy-duty grade.

B. Configuration: NEMA WD 6, Configurations L5-20P and L5-20R.

C. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.

D. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

- E. Standards: Comply with FS W-C-596.

2.8 CORD AND PLUG SETS

- A. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
- B. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
- C. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.9 TOGGLE SWITCHES, 120/277 V, 20 A

- A. Single-Pole Switches, 120/277 V, 20 A:
 - 1. Standards: Comply with UL 20 and FS W-S-896.
- B. Two-Pole Switches, 120/277 V, 20 A:
 - 1. Comply with UL 20 and FS W-S-896.
- C. Three-Way Switches, 120/277 V, 20 A:
 - 1. Comply with UL 20 and FS W-S-896.
- D. Four-Way Switches, 120/277 V, 20 A:
 - 1. Standards: Comply with UL 20 and FS W-S-896.
- E. Pilot-Light, Single-Pole Switches: 120/277 V, 20 A:
 - 1. Description: Illuminated when switch is on.
 - 2. Standards: Comply with UL 20 and FS W-S-896.
- F. Lighted Single-Pole Switches, 120/277 V, 20 A:
 - 1. Description: Handle illuminated when switch is off.
 - 2. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.
- G. Key-Operated, Single-Pole Switches, 120/277 V, 20 A:
 - 1. Description: Factory-supplied key in lieu of switch handle.

2. Standards: Comply with UL 20 and FS W-S-896.
- H. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches, 120/277 V, 20 A:
 1. Description: For use with mechanically held lighting contactors.
 2. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.
- I. Key-Operated, Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches, 120/277 V, 20 A:
 1. Description: For use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.
 2. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.

2.10 OCCUPANCY SENSORS

- A. Wall Switch Sensor Light Switch, Dual Technology:
 1. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using dual (ultrasonic and passive infrared) technology.
 2. Standards: Comply with UL 20.
 3. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
 4. Adjustable time delay of 30 minutes.
 5. Able to be locked to Automatic-On mode.
 6. Connections: Integral wireless networking.
- B. Wall Sensor Light Switch, Passive Infrared:
 1. Description: Switchbox-mounted, combination, lighting-control sensor and conventional switch lighting-control unit using passive infrared technology.
 2. Standards: Comply with UL 20.
 3. Connections: Wireless.
 4. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
 5. Adjustable time delay of 30 minutes.

6. Able to be locked to Automatic-On mode.

C. Wall Sensor Light Switch, Ultrasonic:

1. Description: Switchbox-mounted, combination, lighting-control sensor and conventional switch lighting-control unit using ultrasonic technology.
2. Standards: Comply with UL 20.
3. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
4. Adjustable time delay of 30 minutes.
5. Able to be locked to Automatic-On mode.

2.11 TIMER LIGHT SWITCH

A. Digital Timer Light Switch:

1. Description: Switchbox-mounted, combination digital timer and conventional switch lighting-control unit, with backlit digital display, with selectable time interval in 10-minute increments.
2. Standards: Comply with UL 20.
3. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
4. Integral relay for connection to BAS.

2.12 COMMUNICATIONS OUTLETS

A. Telephone Outlet:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Eaton (Arrow Hart).
 - b. Leviton Manufacturing Co., Inc.
 - c. Hubbell.
2. Description: Single RJ-11 jack for terminating Category 35e, balanced twisted pair cable complying with Section 16123 "Control-Voltage Electrical Power Cables."

3. Standards: Comply with UL 1863.
- B. Combination Telephone and Coaxial Outlet:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Eaton (Arrow Hart).
 - b. Leviton Manufacturing Co., Inc.
 - c. Hubbell.
 2. Description: Single RJ-11 jack for terminating Category 3se, twisted pair cable complying with Section 16123 "Control-Voltage Electrical Power Cables" and a single BNC connector for terminating coaxial cable.
 3. Standards: Comply with UL 1863.

2.13 DIMMERS

- A. Wall-Box Dimmers:
1. Description: Modular, full-wave, solid-state dimmer switch with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
 2. Control: Continuously adjustable slider; with single-pole or three-way switching.
 3. Standards: Comply with UL 1472.
 4. LED Lamp Dimmer Switches: Modular; compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.14 WALL PLATES

- A. Single Source: Obtain wall plates from same manufacturer of wiring devices.
- B. Single and combination types shall match corresponding wiring devices.
1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Material for Finished Spaces: 0.035-inch-thick, satin-finished, Type 302 stainless steel.
 3. Material for Unfinished Spaces: 0.035-inch thick, satin-finished, Type 302 stainless steel.

- 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover and listed and labeled for use in wet and damp locations.
- C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.
- D. Municipal and Industrial Equipment Area Cover Plates: 0.035-inch thick, satin-finished, Type 302 stainless steel.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise noted below:
 - 1. 24 inches above finished floor in municipal and industrial equipment areas.
- B. Coordination with Other Trades:
 - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes, and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall comply with NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.

- b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation:
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
 - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
 - 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
 - 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 - 8. Tighten unused terminal screws on the device.
 - 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
 - 1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.
 - 2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Dimmers:

1. Install dimmers within terms of their listing.
 2. Verify that dimmers used for fan-speed control are listed for that application.
 3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device, listing conditions in the written instructions.
- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top.
- I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.
- 3.2 GFCI RECEPTACLES
- A. Install non-feed-through GFCI receptacles where protection of downstream receptacles is not required.
- 3.3 IDENTIFICATION
- A. Comply with Section 16153 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.
- 3.4 FIELD QUALITY CONTROL
- A. Perform tests and inspections as specified in Section 16670 "Electrical Testing."

END OF SECTION

SECTION 16430
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Receptacle switches.
 - 4. Shunt trip switches.
 - 5. Molded-case circuit breakers (MCCBs).
 - 6. Molded-case switches.
 - 7. Enclosures.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.

3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 4. Include evidence of a nationally recognized testing laboratory (NRTL) listing for series rating of installed devices.
 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
 6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF format.
- B. Shop Drawings: For enclosed switches and circuit breakers.
1. Include plans, elevations, sections, details and attachments to other work.
 2. Include wiring diagrams for power, signal and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Data: Certificates, for enclosed switches and circuit breakers, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Section 01730 "Installation, Operation and Maintenance Manuals," include the following:
 - a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

- b. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in digital format.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 - 2. Fuse Pullers: Two for each size and type.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
 - 2. Altitude: Not exceeding 3300 feet.

1.10 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers and components with equipment served and adjacent surfaces. Maintain required workspace clearances for equipment access doors and panels.

1.11 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: One year(s) from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.2 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with NFPA 70.

2.3 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. ABB (Electrification Products Division).
 - 2. Eaton.
 - 3. Siemens Industry, Inc., Energy Management Division.
 - 4. Square D; by Schneider Electric.
- B. Type HD, Heavy Duty:
 - 1. Single or Double throw as indicated on the drawings.
 - 2. Number of poles as indicated on the drawings.
 - 3. 600-V ac.

4. 1200 A and smaller.
5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses.
6. Lockable handle with capability to accept three padlocks and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
5. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contacts shall be rated for 120-V ac or as indicated on the drawings.
6. Hookstick Handle: Allows use of a hookstick to operate the handle.
7. Lugs: Mechanical type, suitable for number, size, and conductor material.
8. Service-Rated Switches: Labeled for use as service equipment.

2.4 NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. ABB (Electrification Products Division).
 2. Eaton.
 3. Siemens Industry, Inc., Energy Management Division.
 4. Square D; by Schneider Electric.
- B. Type HD, Heavy Duty:

1. Single or Double throw as indicated on the drawings.
2. Number of poles as indicated on the drawings.
3. 600-V ac.
4. 1200 A and smaller.
5. UL 98 and NEMA KS 1, horsepower rated.
6. Lockable handle with capability to accept three padlocks and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
5. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contacts shall be rated for 120-V ac or as indicated on the drawings.
6. Hookstick Handle: Allows use of a hookstick to operate the handle.
7. Lugs: Mechanical type, suitable for number, size, and conductor material.
8. Service-Rated Switches: Labeled for use as service equipment.

2.5 RECEPTACLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. ABB (Electrification Products Division).
 2. Eaton.

3. Siemens Industry, Inc., Energy Management Division.
 4. Square D; by Schneider Electric.
- B. Type HD, Heavy Duty:
1. Single or Double throw as indicated on the drawings.
 2. Number of poles as indicated on the drawings.
 3. 600-V ac.
 4. 100 A and smaller.
 5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses.
 6. Lockable handle with capability to accept three padlocks and interlocked with cover in closed position.
- C. Interlocking Linkage: Provided between the receptacle and switch mechanism to prevent inserting or removing plug while switch is in the on position, inserting any plug other than specified, and turning switch on if an incorrect plug is inserted or correct plug has not been fully inserted into the receptacle.
- D. Receptacle: Polarized, three-phase, four-wire receptacle (fourth wire connected to enclosure ground lug).
- E. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
 4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 5. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contacts shall be rated for 120-V ac or as indicated on the drawings.
 6. Hookstick Handle: Allows use of a hookstick to operate the handle.

7. Lugs: Mechanical type, suitable for number, size, and conductor material.
8. Service-Rated Switches: Labeled for use as service equipment.

2.6 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. ABB (Electrification Products Division).
 2. Eaton.
 3. Siemens Industry, Inc., Energy Management Division.
 4. Square D; by Schneider Electric.
- B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
- C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.
- D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated for the available fault current unless otherwise indicated on the Drawings.
- E. MCCBs shall be equipped with a device for locking in the isolated position.
- F. Lugs shall be suitable for 194 deg F (90 deg C) rated wire, sized according to the 167 deg F (75 deg C) temperature rating in NFPA 70.
- G. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

- I. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- J. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
 - 1. Instantaneous trip.
 - 2. Long- and short-time pickup levels.
 - 3. Long- and short-time time adjustments.
 - 4. Ground-fault pickup level, time delay, and I-squared t response.
- K. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- L. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.
- M. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
- N. Ground-Fault Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).
- O. Features and Accessories:
 - 1. Standard frame sizes, trip ratings, and number of poles.
 - 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
 - 3. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
 - 4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
 - 5. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
 - 6. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

7. Alarm Switch: One NO contact that operates only when circuit breaker has tripped.
8. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
9. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
10. Electrical Operator: Provide remote control for on, off, and reset operations.
11. Accessory Control Power Voltage: Integrally mounted, self-powered; 120-V ac.

2.7 MOLDED-CASE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. ABB (Electrification Products Division).
 2. Eaton.
 3. Siemens Industry, Inc., Energy Management Division.
 4. Square D; by Schneider Electric.
- B. Description: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
- C. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- D. Features and Accessories:
 1. Standard frame sizes and number of poles.
 2. Lugs:
 - a. Mechanical type, suitable for number, size, trip ratings, and conductor material.
 - b. Lugs shall be suitable for 194 deg F (90 deg C) rated wire, sized according to the 167 deg F (75 deg C) temperature rating in NFPA 70.
 3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and

time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.

4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
5. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
6. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic switch contacts, "b" contacts operate in reverse of switch contacts.
7. Alarm Switch: One NO contact that operates only when switch has tripped.
8. Key Interlock Kit: Externally mounted to prohibit switch operation; key shall be removable only when switch is in off position.
9. Zone-Selective Interlocking: Integral with ground-fault shunt trip unit; for interlocking ground-fault protection function.
10. Electrical Operator: Provide remote control for on, off, and reset operations.
11. Accessory Control Power Voltage: Integrally mounted, self-powered; 120-V ac.

2.8 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 1. Indoor, Dry and Clean Locations: NEMA 250, Type 12.
 2. Outdoor Locations: NEMA 250, Type 4X, Stainless Steel.
 3. Other Wet, Damp or Corrosive Locations: NEMA 250, Type 4X, Stainless Steel.
 4. Indoor Locations Subject to Dust, Falling Dirt and Dripping Noncorrosive Liquids: NEMA 250, Type 4.
 5. Hazardous Areas: NEMA 250, Type 7/9.
- B. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.
- C. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked

position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

- D. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.
- E. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.2 INSTALLATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- C. Comply with mounting and anchoring requirements specified in Section 16148 "Seismic Controls for Electrical Systems."
- D. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- E. Install fuses in fusible devices.
- F. Comply with NFPA 70 and NECA 1.

3.3 IDENTIFICATION

- A. Comply with requirements in Section 16153 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections as specified in Section 16670 "Electrical Testing".

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as specified in Section 16675 "Coordination Studies."

END OF SECTION

SECTION 16453
VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections:
 - 1. Section 16012 "Electrical General".
 - 2. Section 16153 "Identification for Electrical Systems".
 - 3. Section 16670 "Electrical Testing"
 - 4. Section 16419 "Motor-Control Centers"
 - 5. Section 16474 "Harmonic Mitigation"
 - 6. Section 16928 "Control System"

1.2 SUMMARY

- A. Section includes separately enclosed, preassembled, combination VFCs, rated 600 V and less, for speed control of three-phase, squirrel-cage induction motors.
- B. The Electrical Control System Integrator (CSI) (see Section 16928) shall be responsible for furnishing the Variable Frequency Controllers including all related equipment as shown on the drawings and as specified herein. The Electrical Contractor shall be responsible for installing the Variable Frequency Controllers, interconnecting wiring and all related equipment per CSI's design.

1.3 DEFINITIONS

- A. CE: Conformance Europeene (European Compliance).
- B. CPT: Control power transformer.
- C. CSI: Control System Integrator.
- D. DDC: Direct digital control.
- E. EMI: Electromagnetic interference.

- F. IGBT: Insulated-gate bipolar transistor
- G. LAN: Local area network.
- H. LED: Light-emitting diode.
- I. MCC: Motor-control center.
- J. MCCB: Molded-case circuit breaker.
- K. MCP: Motor-circuit protector.
- L. NC: Normally closed.
- M. NO: Normally open.
- N. OCPD: Overcurrent protective device.
- O. PID: Control action, proportional plus integral plus derivative.
- P. PWM: Pulse-width modulated.
- Q. RFI: Radio-frequency interference.
- R. SPD: Surge protective device.
- S. VFC: Variable-frequency motor controller.

1.4 ACTION SUBMITTALS

- A. In accordance with the submittal requirements of Section 260100 and 269210, the CSI shall work with the motor control manufacturer to develop and submit to the Engineer, through the Contractor, the following project data:
 - 1. Itemized list of all motor control features and components.
 - 2. System wiring diagrams for each unit of motor control equipment including, but not limited to: all instruments, relays, starters, switches, lights, breakers, terminals, etc. Indicate on submitted diagrams the terminals for remote devices as shown on the wiring diagrams in the contract drawings. Wire and terminal numbers shall be included on the schematic diagrams. Relay contacts shall be indicated for type and number available for each relay used.
 - 3. Information on ratings and sizes of all equipment such as control transformers, fuses, breakers, etc. on the wiring diagrams for each unit.

4. Shop Drawings shall be provided on 11 by 17 inch sheets maximum size and shall be scaled using standard engineering or architectural scales.
 5. Connection diagrams showing physical wiring layout for each unit.
 6. Technical data sheets for all components with the complete part number of the component clearly designated with all required options as specified in PART 2. Provide at a minimum one tab section for each product listed in PART 2 of this section.
 7. Scaled elevation drawings of the motor control equipment exterior and interior with all devices clearly labeled.
 8. Scaled arrangement drawings of all panel front- and internal-mounted instruments, switches, devices and equipment indicated. Show all mounting details required. Deviations from approved arrangements require resubmittal and approval prior to installation.
 9. Bill of materials showing quality, manufacturer, catalog number and the supplier name and phone number for all components of the motor control.
- B. Product Data: For each type and rating of VFC indicated.
1. Include dimensions and finishes for VFCs.
 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- C. Shop Drawings: For each VFC indicated.
1. For motor controllers installed in MCC compartments, reference specification Section 16419 "Motor-Control Centers".
 2. For each VFC indicated:
 - a. Include plans, elevations, sections, and mounting details.
 - b. Indicate dimensions, weights, required clearances, and location and size of each field connection.
 - c. Wire Termination Diagrams and Schedules: Include diagrams for signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features. Differentiate between manufacturer-installed and field-installed wiring.

- d. Include features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
- e. Comply with other “Shop Drawing” requirements of Section 16928.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans, drawn to scale, showing dimensioned layout on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Required working clearances and required area above and around VFCs.
 - 2. Show VFC layout and relationships between electrical components and adjacent structural and mechanical elements.
 - 3. Show support locations, type of support, and weight on each support.
 - 4. Indicate field measurements.
- B. Qualification Data: For testing agency.
- C. Seismic Qualification Data: Certificates, for each VFC, accessories, and components, from manufacturer.
 - 1. Certificate of compliance.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based, and their installation requirements.
- D. Product Certificates: For each VFC from manufacturer.
- E. Harmonic Analysis Report: Provide Project-specific calculations and manufacturer's statement of compliance with IEEE 519.
- F. Source quality-control reports.
- G. Field quality-control reports.
- H. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For VFCs to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 01730 "Installation, Operation, and Maintenance Manuals," include the following:
 - a. Manufacturer's record drawings as defined in UL 845 for controllers installed in MCCs or as described in Section 16928. In addition to requirements specified in UL 845, include field modifications and field assigned wiring identification incorporated during construction by manufacturer, Contractor or both.
 - b. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and motor-circuit protector trip settings.
 - c. Manufacturer's written instructions for setting field-adjustable overload relays.
 - d. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
 - e. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.
 - f. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.
 - g. Warranty: Sample of special warranty.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 - 2. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
 - 3. Indicating Lights: Two of each type and color installed.

4. Auxiliary Contacts: Furnish one spare(s) for each size and type of magnetic controller installed.
5. Power Contacts: Furnish three spares for each size and type of magnetic contactor installed.

1.8 QUALITY ASSURANCE

- A. Source Limitations: Obtain VFCs and controllers of a single type from a single source from a single manufacturer.
- B. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Testing Agency Qualifications: Accredited by NETA.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- D. Comply with NFPA 70.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment to the job site at the appropriate time for installation and only after receiving final approval on Factory Acceptance Testing from the Engineer. Equipment items shall be crated or affixed to pallets with protective wrappings. Exercise care to prevent damage from handling. Store mechanical and electrical components off the ground in weathertight enclosures. Keep equipment dry at all times.
- B. If stored in space that is not permanently enclosed and air conditioned, remove loose packing and flammable materials from inside controllers and install temporary electric heating, with at least 250 W per controller or connect factory installed space heaters to temporary electrical service.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for VFCs, including clearances between VFCs, and adjacent surfaces and other items.

1.10 COORDINATION

- A. Coordinate sizes and installation location of VFCs.
- B. Coordinate features of VFCs, installed units and accessory devices with remote pilot devices and control circuits to which they connect.
- C. Coordinate features, accessories and functions of each controller and each installed unit with ratings and characteristics of supply circuits, motors, required control sequences, and duty cycle of motors and loads.

1.11 COORDINATION WITH CONTROL SYSTEM

- A. The CSI, as specified in Section 16928, shall be solely and completely responsible for coordination and integration of the Control System with the Motor Controllers.

1.12 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace VFCs that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with project requirements, available manufacturers offering projects that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Allen Bradley, Rockwell Automation, Inc.
 - 2. Eaton Corporation
 - 3. Square D Company
 - 4. Siemens

2.2 SYSTEM DESCRIPTION

- A. General Requirements for VFCs:
 - 1. VFCs and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Comply with NEMA ICS 7, NEMA ICS 61800-2, and UL 508C.
- B. Application: Constant torque and variable torque.
- C. VFC Description: Variable-frequency motor controller, consisting of power converter that employs pulse-width-modulated inverter, factory built and tested in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged to provide self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency.

1. Units suitable for operation of NEMA MG 1, Design A and Design B motors, as defined by NEMA MG 1, Section IV, Part 30, "Application Considerations for Constant Speed Motors Used on a Sinusoidal Bus with Harmonic Content and General Purpose Motors Used with Adjustable-Voltage or Adjustable-Frequency Controls or Both."
 2. Units suitable for operation of inverter-duty motors as defined by NEMA MG 1, Section IV, Part 31, "Definite-Purpose Inverter-Fed Polyphase Motors."
 3. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to authorities having jurisdiction.
 4. Listed and labeled for single-phase use by an NRTL acceptable to authorities having jurisdiction.
- D. Design and Rating: Match load type, such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.
- E. Output Rating: Three phase; 10 to 60 Hz, with voltage proportional to frequency throughout voltage range; maximum voltage equals input voltage.
- F. Unit Operating Requirements:
1. Input AC Voltage Tolerance: Plus 10 and minus 10 percent of VFC input voltage rating.
 2. Input AC Voltage Unbalance: Not exceeding 5 percent.
 3. Input Frequency Tolerance: Plus or minus 3 percent of VFC frequency rating.
 4. Minimum Efficiency: 97 percent at 60 Hz, full load.
 5. Minimum Displacement Primary-Side Power Factor: 98 percent under any load or speed condition.
 6. Ambient Temperature Rating: Not less than 32 deg F and not exceeding 104 deg F with and average value exceeding 95 deg F over a 24-hour period.
 7. Humidity Rating: Less than 95 percent (noncondensing).
 8. Altitude Rating: Not exceeding 3300 feet.
 9. Vibration Withstand: Comply with NEMA ICS 61800-2.

10. Overload Capability for Variable-Torque Applications: 1.5 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
 11. Starting Torque for Constant Torque Applications: Minimum 100 percent of rated torque from 3 to 60 Hz.
 12. Speed Regulation: Plus or minus 1 percent of rated speed.
 13. Output Carrier Frequency: Selectable; 1 to 12 kHz.
 14. Stop Modes: Programmable; includes fast, free-wheel, and dc injection braking.
- G. Inverter Logic: Microprocessor based, 16 bit, isolated from all power circuits.
- H. Isolated Control Interface: Allows VFCs to follow remote-control signal over a minimum 40:1 speed range.
1. Signal: Electrical.
- I. Internal Adjustability Capabilities:
1. Minimum Speed: 5 to 25 percent of maximum rpm.
 2. Maximum Speed: 80 to 100 percent of maximum rpm.
 3. Acceleration: 0.1 to 999.9 seconds.
 4. Deceleration: 0.1 to 999.9 seconds.
 5. Current Limit: 30 to minimum of 150 percent of maximum rating.
- J. Self-Protection and Reliability Features:
1. Input transient protection by means of surge suppressors to provide three-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
 2. Surge Suppression: Factory installed as an integral part of the VFC, complying with Section 16483 "Surge-Protection for Low-Voltage Electrical Power Circuits".
- K. Surge Suppression: Field-mounted surge suppressors complying with Section 16483 "Surge Protection for Low-Voltage Electrical Power Circuits".
1. Loss of Input Signal Protection: Selectable response strategy, including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.

2. Undervoltage and overvoltage trips.
 3. Inverter overcurrent trips.
 4. VFC and Motor-Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing VFC overtemperature and motor-overload alarm and trip; settings selectable via the keypad.
 5. Critical frequency rejection, with three selectable, adjustable deadbands.
 6. Instantaneous line-to-line and line-to-ground overcurrent trips.
 7. Loss-of-phase protection.
 8. Reverse-phase protection.
 9. Short-circuit protection.
 10. Motor-overtemperature fault.
- L. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts.
- M. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped, unless "Bidirectional Autospeed Search" feature is available and engaged.
- N. Bidirectional Autospeed Search: Capable of starting VFC into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to drive, motor, or load.
- O. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.
- P. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.
- Q. Integral Input Disconnecting Means and OCPD: UL 489, thermal-magnetic circuit breaker with pad-lockable, door-mounted handle mechanism.
1. Disconnect Rating: Not less than 115 percent of NFPA 70 motor full-load current rating or VFC input current rating, whichever is larger.

2. Auxiliary Contacts: NO or NC, arranged to activate before switch blades open.
3. Auxiliary contacts "a" and "b" arranged to activate with circuit-breaker handle.
4. NC alarm contact that operates only when circuit breaker has tripped.

R. Control Power

1. 120-VAC; obtained from CPT integral with controller size to be determined by the C.S.I based on loads served. The CPT shall be of sufficient capacity to operate integral devices and remotely located pilot, indicating and control devices with spare capacity as indicated.
 - a. Spare Capacity: 25% excess capacity.
 - b. Primary and secondary fuses for current-limiting and overload protection of transformer and fuses for protection of control circuits.
2. 24-VDC; obtain from VFC to operate integral devices and remotely located pilot, indicating and control devices.

2.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: VFCs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7. The designated VFCs shall be tested and certified by an NRTL as meeting the ICC-ES AC 156 test procedure requirements.
1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.4 CONTROLS AND INDICATION

- A. Status Lights: Door-mounted LED indicators displaying the following conditions:
1. Run.
 2. Drive Fault.
 3. Motor Overtemperature.
 4. And any other lights as indicated on the drawings.
- B. Panel-Mounted Operator Station: Manufacturer's standard front-accessible, sealed keypad and plain-English-language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.

1. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.
 2. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: View only; view and operate; and view, operate, and service.
 - a. Control Authority: Supports at least four conditions: Off, local manual control at VFC, local automatic control at VFC, and automatic control through a remote source.
- C. Historical Logging Information and Displays:
1. Real-time clock with current time and date.
 2. Running log of total power versus time.
 3. Total run time.
 4. Fault log, maintaining last four faults with time and date stamp for each.
- D. Indicating Devices: Digital display and additional readout devices as required, mounted flush in VFC door and connected to display VFC parameters including, but not limited to:
1. Output frequency (Hz).
 2. Motor speed (rpm).
 3. Motor status (running, stop, fault).
 4. Motor current (amperes).
 5. Motor torque (percent).
 6. Fault or alarming status (code).
 7. PID feedback signal (percent).
 8. DC-link voltage (V dc).
 9. Set point frequency (Hz).
 10. Motor output voltage (V ac).
 11. Power (KVA)
- E. Control Signal Interfaces:

1. Electric Input Signal Interface:
 - a. A minimum of two programmable analog inputs: 4- to 20-mA dc.
 - b. A minimum of six multifunction programmable digital inputs.
2. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the DDC system for HVAC or other control systems:
 - a. 0- to 10-V dc.
 - b. 4- to 20-mA dc.
 - c. Potentiometer using up/down digital inputs.
 - d. Fixed frequencies using digital inputs.
3. Output Signal Interface: A minimum of one programmable analog output signal(s) (4- to 20-mA dc), which can be configured for any of the following:
 - a. Output frequency (Hz).
 - b. Output current (load).
 - c. DC-link voltage (V dc).
 - d. Motor torque (percent).
 - e. Motor speed (rpm).
 - f. Set point frequency (Hz).
4. Remote Indication Interface: A minimum of six programmable dry-circuit relay outputs (120-V ac, 1 A) for remote indication of the following:
 - a. Motor running.
 - b. Set point speed reached.
 - c. Fault and warning indication (overtemperature or overcurrent).
 - d. As indicated on the drawings.
5. Discrete Input Interface: A minimum of eight programmable 120VAC/24VDC inputs for monitoring and control as indicated on the drawings.

- F. PID Control Interface: Provides closed-loop set point, differential feedback control in response to dual feedback signals. Allows for closed-loop control of fans and pumps for pressure, flow, or temperature regulation.
 - 1. Number of Loops: Two.
- G. PLC Interface: Factory-installed hardware and software to enable the PLC system to monitor, control and display VFC status, alarms and energy usage. Allows VFC to be used with an external system within a multidrop LAN configuration; settings retained within VFC's nonvolatile memory.
 - 1. Network Communications Ports: Ethernet and RS-422/485.
 - 2. Protocols for Network Communications: Ethernet TCP/IP; protocols accessible via the communications ports.

2.5 LINE CONDITIONING AND FILTERING

- A. Input Line Conditioning: Based on the manufacturer's harmonic analysis study and report, provide input filtering, as required, to limit total demand (harmonic current) distortion and total harmonic voltage demand at the defined point of common coupling to meet IEEE 519 recommendations.
- B. Input Line Conditioning: 3 percent line reactor or as indicated on the drawings.
- C. Output Filtering: As indicated on the drawings.
- D. EMI/RFI Filtering: As indicated on the drawings.

2.6 BYPASS SYSTEMS (WHERE INDICATED ON THE DRAWINGS)

- A. Bypass Operation: Safely transfers motor between power converter output and bypass circuit, manually, automatically, or both. Selector switches set modes and indicator lights indicate mode selected. Unit is capable of stable operation (starting, stopping, and running) with motor completely disconnected from power converter.
- B. Bypass Mode: Field-selectable automatic or manual, allows local and remote transfer between power converter and bypass contactor and retransfer, either via manual operator interface or automatic-control system feedback.
- C. Bypass Controller: Three-contactor-style bypass allows motor operation via the power converter or the bypass controller; with input isolating switch and barrier arranged to isolate the power converter input and output and permit safe testing and troubleshooting of the power converter, both energized and de-energized, while motor is operating in bypass mode.
 - 1. Bypass Contactor: Load-break, NEMA-rated contactor.

2. Input and Output Isolating Contactors: Non-load-break, NEMA-rated contactors.
 3. Isolating Switch: Non-load-break switch arranged to isolate power converter and permit safe troubleshooting and testing of the power converter, both energized and de-energized, while motor is operating in bypass mode; pad-lockable, door-mounted handle mechanism.
- D. Bypass Contactor Configuration: Full-voltage (across-the-line) type.
1. NORMAL/BYPASS selector switch.
 2. HAND/OFF/AUTO selector switch.
 3. NORMAL/TEST Selector Switch: Allows testing and adjusting of VFC while the motor is running in the bypass mode.
 4. Contactor Coils: Pressure-encapsulated type with coil transient suppressors.
 - a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.
 - b. Power Contacts: Totally enclosed, double break, and silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
 5. Control Circuits: 120-V ac; obtained from integral CPT, with primary and secondary fuses, with CPT of sufficient capacity to operate all integral devices and remotely located pilot, indicating, and control devices.
 - a. CPT Spare Capacity: 25% excess capacity.
 - b. Solid-State Overload Relays:
 - 1) Switch or dial selectable for motor-running overload protection.
 - 2) Sensors in each phase.
 - 3) Class 10/20 selectable tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
 - c. NO isolated overload alarm contact.
 - d. External overload, reset push button.

2.7 OPTIONAL FEATURES

- A. Multiple-Motor Capability: VFC suitable for variable-speed service to multiple motors. Overload protection shuts down VFC and motors served by it, and generates fault indications when overload protection activates.
 - 1. Configure to allow two or more motors to operate simultaneously at the same speed; separate overload relay for each controlled motor.
 - 2. Configure to allow two motors to operate separately; operator selectable via local or remote switch or contact closures; single overload relay for both motors; separate output magnetic contactors for each motor.
 - 3. Configure to allow two motors to operate simultaneously and in a lead/lag mode, with one motor operated at variable speed via the power converter and the other at constant speed via the bypass controller; separate overload relay for each controlled motor.
- B. Damper control circuit with end-of-travel feedback capability.
- C. Sleep Function: Senses a minimal deviation of a feedback signal and stops the motor. On an increase in speed-command signal deviation, VFC resumes normal operation.
- D. Motor Preheat Function: Preheats motor when idle to prevent moisture accumulation in the motor.
- E. Remote Indicating Circuit Terminals: Mode selection, controller status, and controller fault.
- F. Remote digital operator kit.
- G. Communication Port: RS-232 port, USB 2.0 port, or equivalent connection capable of a notebook computer.

2.8 ENCLOSURES

- A. Controllers in MCC Compartments: Reference specification Section 16419.
- B. All Other Controllers: Reference specification Section 16928 for enclosure requirements.
- C. Provide corrosion inhibitors in all motor control enclosures prior to shipping. Amount of inhibitor shall be provided for the volume of the enclosure for one year.
- D. The construction of the enclosures shall comply with NEMA ICS 6.
- E. Controllers in hazardous (classified) locations shall comply with UL 1203.

2.9 ACCESSORIES

- A. General Requirements for Control-Circuit and Pilot Devices: NEMA ICS 5; factory installed in VFC enclosure cover unless otherwise indicated.
 - 1. Push Buttons, Pilot Lights, and Selector Switches: Heavy-duty, oil-tight type. Standard-duty, except as needed to match enclosure type. Heavy-duty or oil-tight where indicated in the controller schedule.
 - a. Push Buttons: Unguarded types; momentary contact unless otherwise indicated.
 - b. Pilot Lights: LED Types; push to test. As indicated in the controller schedule.
 - c. Selector Switches: Rotary Type.
- B. Reversible NC/NO bypass contactor auxiliary contact(s).
- C. Control Relays: Auxiliary and adjustable solid-state time-delay relays.
- D. Control Relays, General Purpose: Relays for general purpose use shall be DPDT or 3PDT, 10 amp contacts with appropriate coil voltage for the application. They shall have an 8-pin base, matching socket and contact status indicator.
- E. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.
 - 1. Current Transformers: Continuous current rating, basic impulse insulating level (BIL) rating, burden, and accuracy class suitable for connected circuitry. Comply with IEEE C57.13.
- F. Supplemental Digital Meters:
 - 1. Elapsed-time meter.
- G. Space heaters, with NC auxiliary contacts, to mitigate condensation in enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
- H. Cooling Fan and Exhaust System: Cooling fans shall maintain the enclosure rating of the enclosures in which they are installed. UL 508 component recognized: Supply fan, with stainless-steel intake and exhaust grills and filters; 120-V ac; obtained from integral CPT.
- I. Sun shields installed on fronts, sides, and tops of enclosures installed outdoors and subject to direct and extended sun exposure.

- J. Spare control-wiring terminal blocks; wired.
- K. Terminal Blocks: Terminal boards shall be 300 or 600 volt modular terminal blocks with tubular screw and pressure plate. Terminal shall be sized to accept #2-14 AWG wire minimum. Provide a minimum of 20% or four (whichever is more) spare terminals in each bucket. Allen-Bradley Bulletin 1492-CA1 or approved equal.

2.10 SOURCE QUALITY CONTROL

- A. Testing: Test and inspect VFCs according to requirements in NEMA ICS 61800-2.
 - 1. Test each VFC while connected to a motor that is comparable to that for which the VFC is rated.
 - 2. Verification of Performance: Rate VFCs according to operation of functions and features specified.
- B. VFCs will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

PART 3 EXECUTION

3.1 GENERAL

- A. It is the Contractor's responsibility to verify that the motor starters, protection equipment and other components provided are suitable (correct phase, voltage, starter type, breakers and overload relays) for the motors and equipment loads being served.
- B. Operator interface devices such as metering and devices with control and displays shall be installed between 5' and 5'-8" above finished floor. Operator interface devices on full height sections shall be installed between 4'-6" and 6' above finished floor.
- C. Provide wire and terminal numbering on all wires and terminals.
- D. Provide schematic and layout drawings for each individual unit.

3.2 FACTORY ACCEPTANCE TESTING

- A. Motor control equipment shall be tested in the CSI's shop along with the control system per the requirements in this Section and 16928 "Control System". Operation of the motor control equipment shall be tested in the shop by the Control System Integrator. The testing shall include, but not be limited to, operation of all input and output (I/O) points, control devices and motor controllers 24 hours per day for a continuous period of at least one (1) week.

- B. Testing and inspection of motor control equipment shall include all components. All motor controllers shall be interconnected with the control system and powered with rated incoming voltage.
- C. After completion of initial testing, the CSI shall conduct subsequent testing for inspection by the Engineer. The CSI shall provide for time, equipment and support in their shop for the Engineer to test the motor control equipment for a period of up to 3 days. All control functions and all status and alarm monitoring and indication shall be demonstrated under simulated operating conditions. Simulating equipment shall be provided and wired into the motor control equipment for this testing. The CSI shall revise, modify and adjust the motor control equipment as required by the Engineer during the testing period.
- D. Once all changes and modifications required by the Engineer identified during the testing are made and the corrective action taken is to the satisfaction of the Engineer, motor control equipment may be released for delivery to the site upon receiving approval from the Engineer.

3.3 EXAMINATION

- A. Examine areas, surfaces, and substrates to receive VFCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.
- B. Examine VFC before installation. Reject VFCs that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFC installation.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 HARMONIC ANALYSIS STUDY

- A. Perform a harmonic analysis study to identify the effects of nonlinear loads and their associated harmonic contributions on the voltages and currents throughout the electrical system. Analyze designated operating scenarios, including recommendations for VFC input filtering to limit TDD and THD(V) at the defined PCC to specified levels.
- B. Prepare a harmonic analysis study report complying with IEEE 519-2014 and NETA Acceptance Testing Specifications.

3.5 INSTALLATION

A. GENERAL

1. The motor control equipment shall not be shipped to the site until it has been inspected and tested to the satisfaction of the Engineer (reference Section 16928 and 16419 for requirements) and a suitable environment is available for installation of the equipment. A suitable environment for the purposes of this contract for motor control equipment shall be dry, covered and heated to maintain a minimum ambient temperature of 60 degrees F. Prior to shipment of electrical equipment, the Contractor shall contact the Engineer for field verification of a suitable environment.
 2. The motor control center shall be installed in accordance with the installation drawings and instructions. Installation shall be performed by workers who are skilled and experienced in the installation of motor control equipment. It is the contractor's responsibility to provide sufficient space for the equipment and size of equipment to fit within the space requirements and meet all code requirements.
 3. Installation shall include all elements and components of motor control equipment and all conduit and interconnecting wiring between all elements, components and sensors. All wiring between cabinets, sensors, pumps and equipment shall be multiple color coded with at least twenty individual colors for ease of servicing. All terminations shall be made with solderless pressure connectors. All wiring shall be in accordance with the requirements of Section 16119 and 16123. Intrinsically safe wiring shall be separated with barriers per NEC requirements.
- B. Coordinate layout and installation of VFCs with other construction work including conduit, piping, equipment and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- C. Wall-Mounting Controllers: Install with tops at uniform height and with disconnect operating handles not higher than 79 inches above finished floor, unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Section 16129 "Hangers and Supports for Electrical Systems."
- D. Floor-Mounting Controllers: Install VFCs on 4-inch nominal thickness concrete base. Comply with requirements for concrete base specified in Section 03300 "Cast-in-Place Concrete."
1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.

2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
- E. Seismic Bracing: Comply with requirements specified in Section 16148 "Seismic Controls for Electrical Systems."
- F. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- G. Install fuses in each fusible-switch VFC.
- H. Install fuses in control circuits if not factory installed.
- I. Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors are installed.
- J. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
- K. Comply with NECA 1.

3.6 CONTROL WIRING INSTALLATION

- A. Install wiring between VFCs and remote devices and facility's central-control system. Comply with requirements in Section 16123 "Control-Voltage Electrical Power Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic-control devices where applicable.
1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switches are in manual-control position.
 2. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor-overload protectors.

3.7 IDENTIFICATION

- A. Identify VFCs, components, and control wiring. Comply with requirements for identification specified in Section 16153 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each VFC with engraved nameplate.
 - 3. Label each enclosure-mounted control and pilot device.
 - 4. Mark up a set of manufacturer's connection wiring diagrams with field assigned wiring identifications and return to manufacturer for inclusion in Record Drawings.
- B. Operating Instructions: Frame printed operating instructions for VFCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of VFC units.

3.8 CONNECTIONS

- A. Comply with requirements for installation of conduit in Section 16133 "Raceways and Boxes for Electrical Systems." Drawings indicate general arrangement of conduit, fittings and specialties.
- B. Comply with requirements in Section 16126 "Grounding and Bonding for Electrical Systems."

3.9 FIELD QUALITY CONTROL

- A. Perform tests and inspections as specified in Section 16670 "Electrical Testing".

3.10 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.11 ADJUSTING

- A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.

- B. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.
- C. Adjust the trip settings of instantaneous-only circuit breakers and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to 6 times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed 8 times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Engineer before increasing settings.
- D. Set field-adjustable circuit-breaker trip ranges.
- E. Set field-adjustable pressure switches.

3.12 PROTECTION

- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until controllers are ready to be energized and placed into service.
- B. Replace VFCs whose interiors have been exposed to water or other liquids prior to Substantial Completion.

3.13 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, reprogram, and maintain VFCs.

END OF SECTION

SECTION 16474
HARMONIC MITIGATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Active harmonic filters.
- B. Related Sections:
 - 1. Section 16419 "Motor Control Centers".

1.3 STANDARDS:

- A. Products shall be designed, manufactured, tested, and installed in compliance with the following standards:
- B. ANSI C-84.1-2006
- C. UL-508C
- D. IEEE-519-2014

1.4 DESCRIPTION OF WORK

- A. Provide harmonic mitigation equipment work as shown, scheduled, indicated, and as specified.
- B. Size active filter for 50 Percent diversity for the connected load. In no case shall the active filter be required to provide more than 200A of corrective current.
- C. Seismic Performance: harmonic mitigation equipment shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for active harmonic filter. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Field quality-control reports.
- D. Maintenance Data: For harmonic mitigation equipment to include in maintenance manuals.
- E. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.
- F. Warranty: Sample of special warranty.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. The harmonic mitigation equipment shall be handled, stored and installed in accordance with the manufacturer's recommended practices as found in the installation, operation and maintenance manuals. Installation shall comply with all applicable codes.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- C. Source Limitations for harmonic mitigation equipment: Obtain equipment from single source.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install Active Harmonic filter until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions by field measurements before installation.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of active harmonic filter that fail(s) in materials or workmanship within specified warranty period.
 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. Except as otherwise indicated, provide harmonic mitigation equipment manufacturer's standard materials and components as indicated by his published product information, designed and constructed as recommended by the manufacturer, and as required for a complete installation

2.2 MANUFACTURERS

- A. Active Harmonic Filter Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Trans-Coil International, LLC.
 2. Times One.
 3. Eaton Corporation

4. Mesta Electronics, Inc.
5. Staco Energy Products
6. Allen Bradley.

2.3 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect assembled active harmonic filter, by a qualified testing agency, according to IEEE NEMA.

2.4 ACTIVE HARMONIC FILTERS

A. ENCLOSURES

1. Each power correction unit shall be provided in an IP-20 (aka NEMA 1) rated enclosure.
2. Units rated 100 amperes and under for total output current shall be designed for wall mounting with cable entry through the bottom. Units rated greater than 100 amperes for total output current shall be freestanding for mounting to the floor with cable entry through the top.
3. Freestanding units shall include a door-interlocked disconnect that provides power interruption when the door is opened. Disconnect shall be lockable in the power-off position. Wall mount units shall be disconnected from the power source by a disconnect device or circuit breaker contained in the power distribution center as defined by local and national codes for branch circuit protection.
4. Freestanding units shall include lifting provisions by forklift truck and lifting lugs. Wall mount units weighing more than 80 pounds shall have lifting lugs.
5. All units shall include 200,000 AIC rated fuses with Class T actuation.
6. All units shall be provided with a grounding lug.
7. The paint shall be the manufacturer's standard type and color.

B. OPERATOR CONTROLS AND INTERFACE

1. All units shall include a digital interface model (DIM) that includes an alphanumeric display consisting of 2-lines with 20 characters per line. All information shall be in English. Display shall be easily viewed under all lighting conditions, including sunlight, as found inside buildings.
2. Operators include run, stop, setup, enter, and up/down scroll.

3. The display shall provide operating data while functioning. Standard operating parameters available for display are AC line voltage, total rms load current, harmonic current of load, reactive current of load, output harmonic and reactive current of power correction system.
4. When the output of the power correction unit is at full rated capacity, the display shall indicate at-maximum capacity and actuate an at-maximum capacity relay.
5. All fault conditions shall be displayed as they occur. Diagnostic information shall be provided in English and clearly indicate the nature of the fault.
6. The run pushbutton shall include a green LED. LED shall be lighted when unit is operating.
7. Contacts shall be provided for operator information for power-on, run, fault and at-maximum capacity. Each contact shall be rated for 1 ampere at 120/240 volts. One form C contact shall be provided for each relay.
8. A RS485 serial communication port shall be provided for remote control and diagnostic information.
9. Provide Ethernet communications for SCADA System interface.

C. DESIGN REQUIREMENTS

1. All power correction units shall be defined as a power electronic device consisting of power semiconductors that switch into the AC lines to modulate its output to cancel detrimental harmonic and/or re-active currents. A DC bus shall store power for power semiconductor switching. A microprocessor shall control the operation of the power converter.
2. Each unit shall be designed with a current limiting function to protect the semiconductors. When this level is attained, a message shall be displayed indicating the output capacity is at-maximum capacity and actuate the at-maximum capacity relay. Operation shall continue indefinitely at this level without trip off or destruction of the power correction unit.
3. Each unit shall incorporate an over-temperature output roll back that reduces the total output current in order to maintain maximum current correction within the electrical system.
4. Two distinct levels of faults shall be employed. Non-critical level faults will provide automatic restart and a return to normal operation upon automatic fault clearance. Critical level faults stop the function of the unit and await operator action.

- a. Faults such as AC line over voltage, AC line under-voltage, AC line power loss, and AC line phase imbalance shall be considered non-critical and automatically restarted. Upon removal of these fault conditions, the power correction system shall restart without user action. Automatic restart will not occur if 5 faults have occurred in less than 5 minutes. During the fault condition, except line loss, the display shall state the type of fault and indicate that automatic restart will occur. The run relay and run LED shall be disabled. The fault relay shall not be enabled unless time out occurs. Upon AC line loss, the power-on relay shall be disabled and no display shall be provided.
 - b. All other types of faults shall be considered critical and stop the power correction system. The display shall indicate the fault condition and "stop." The run LED and relay shall be disabled and the fault relay enabled. User shall be required to initiate a power reset (turn power off and on) to restart the power correction system.
- 5. The logic of the power correction system shall monitor the load current by utilizing two (2) current transducers (CTs) mounted on phases A and C to direct the function of the power electronic converter. The ratio of the CTs must be entered into the logic via the digital keypad/display to calibrate the operation of the power correction system. The output of the current transducers shall be 5 amperes.
 - 6. Up to 5 power correction units may be installed in parallel to inject current according to the information received from one set of CTs. The units will function independently. If one unit is stopped or faulted, the remaining units will adjust accordingly to maintain optimum harmonic cancellation levels up to the capacity of the remaining units.

PART 3 EXECUTION

3.1 HARMONIC FILTER INSTALLATION

- A. Install harmonic mitigation equipment where shown, in accordance with the manufacturer's written instructions and recognized industry practices to ensure that the harmonic mitigation equipment comply with the requirements and serve the intended purposes. Comply with the requirements of NEMA, NEC standards and all other applicable codes.
- B. Equipment Mounting: Install enclosure on concrete base.
- C. Comply with NECA 1.
- D. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.

1. Comply with requirements for raceways and boxes specified in Division 16 Section "Raceways and Boxes."
 - E. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
- 3.2 IDENTIFICATION
- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 16 Section "Electrical Identification."
- 3.3 FIELD QUALITY CONTROL
- A. Perform tests and inspections as specified in section 16670 "Electrical Testing".
- 3.4 ADJUSTING
- A. Adjust harmonic mitigation equipment to function smoothly, as recommended by manufacturer.
 - B. Occupancy Adjustments: When requested within 6 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions.
- 3.5 DEMONSTRATION
- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain.

END OF SECTION

SECTION 16483
SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Surge protection for electrical distribution equipment.
 - 2. Surge protection for control panels, motor control panels, telemetry panels and other sensitive electronic equipment.
 - 3. Surge protection for data communications, signaling and control circuits.
 - 4. Enclosures.
 - 5. Conductors and cables.

1.3 DEFINITIONS

- A. Inominal: Nominal discharge current. The peak value of the current that can be passed through the SPD having a waveshape of 8/20 μ s where the SPD remains functional after 15 surges.
- B. I_{max}: Maximum surge rating when a device is subjected to a single 8/20 μ s waveshape that it can withstand with degradation to the SPD.
- C. MCOV: Maximum continuous operating voltage.
- D. Mode(s), also Modes of Protection: air of electrical connections where the VPR applies.
- E. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic.
- F. NRTL: Nationally recognized testing laboratory.
- G. OCPD: Overcurrent protective device.
- H. SCCR: Short-circuit current rating.

- I. SPD: Surge protective device.
- J. TOV: Temporary Over Voltage
- K. Type 1 SPDs: Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service disconnect overcurrent device.
- L. Type 2 SPDs: Permanently connected SPDs intended for installation on the load side of the service disconnect overcurrent device, including SPDs located at the branch panel.
- M. Type 3 SPDs: Point of utilization SPDs.
- N. Type 4 SPDs: Component SPDs, including discrete components, as well as assemblies.
- O. Type 5 SPDs: Discrete component surge suppressors, such as MOVs that may be mounted on a printed wiring board, connected by its leads or provided within an enclosure with mounting means and wiring terminations.
- P. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include electrical characteristics, specialties, and accessories for SPDs.
 - 2. NRTL certification of compliance with UL 1449.
 - a. Tested values for VPRs.
 - b. Inominal ratings.
 - c. MCOV, type designations.
 - d. OCPD requirements.
 - e. Manufacturer's model number.
 - f. System voltage.
 - g. Modes of protection.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

- B. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For SPDs to include in maintenance manuals.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace SPDs that fail in materials or workmanship within five years from date of Substantial Completion.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Comply with IEEE C62.41.2 and test devices according to IEEE C62.45.

1.9 PROJECT CONDITIONS

- A. Service Conditions: SPDs shall be rated for continuous operation under the following conditions unless otherwise indicated:
 - 1. Operating Temperature: -30 to 130 degrees F.
 - 2. Humidity: 0 to 95 percent, noncondensing.
 - 3. Altitude: Less than 12,000 feet above sea level.

PART 2 PRODUCTS

2.1 DISTRIBUTION SYSTEM SURGE PROTECTION DEVICES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Citel
 - 2. Eaton
 - 3. Schneider Electric USA, Inc.
 - 4. Siemens Industry, Inc., Energy Management Division.

- B. Design Categories: SPDs shall be coordinated with the electrical distribution system based on the following three categories.
1. Category A: Includes all service entrance equipment and any 480V and higher distribution equipment serving equipment exposed to outside surges.
 2. Category B: Includes all 480V distribution equipment serving loads including, but not limited to, panelboards, switchboards, switchgear and motor control centers.
 3. Category C: Includes branch panelboards and load centers that are not exposed to outside surges and power only local, low-voltage loads.
- C. Source Limitations: Obtain devices from a single source from a single manufacturer.
- D. Standards: Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1449, 4th Edition, Type 1.
- E. General Requirements for Service Entrance SPDs:
1. Devices shall be connected in parallel. Series connected devices will not be accepted.
 2. Units shall have thermally protected MOVs, individually fused.
 3. Units shall simultaneously monitor each MOV and provide visual indication of protection status.
 4. Units shall have Form C dry contacts for remote alarm indication.
 5. MCOV: Not less than 125 percent of nominal system voltage.
- F. Requirements for Category A SPDs:
1. Description: Integral units.
 2. Inominal: 20kA.
 3. Surge Current Rating: 100kA (per mode), 240kA (per phase) or higher.
 4. UL Short Circuit Current Rating (SCCR): 200kA
 5. Protection for all applicable modes, differential (L-L, L-N) and common (L-G, N-G).
 6. Voltage Protection Ratings not to exceed the following:

**SECTION 16483 – 4 SURGE PROTECTION FOR
LOW-VOLTAGE ELECTRICAL POWER CIRCUITS**

a. 120/240V, high-leg, single-phase, three-wire:

- 1) L-G, N-G: 700 V.
- 2) N-G: 700 V.
- 3) L-N: 700 V.
- 4) L-L: 1200 V.

b. 120/240V, high-leg, three-phase, four-wire:

- 1) L-G: 1200 V.
- 2) N-G: 800 V.
- 3) L-N: 1200 V.
- 4) L-L: 2000 V.

c. 208Y/120V, three-phase, four-wire:

- 1) L-G: 900 V.
- 2) N-G: 900 V.
- 3) L-N: 900 V.
- 4) L-L: 1200 V.

d. 480Y/277, three-phase, four-wire:

- 1) L-G: 1200 V.
- 2) N-G: 1200 V.
- 3) L-N: 1200 V.
- 4) L-L: 2000 V.

G. Requirements for Category B SPDs:

1. Inominal: 20kA.
2. Surge Current Rating: 50kA (per mode), 150kA (per phase) or higher.
3. SCCR: 200kA.

4. Protection for all applicable modes, differential (L-L, L-N) and common (L-G, N-G).
5. Voltage Protection Ratings not to exceed the following:
 - a. 120/240V, high-leg, single-phase, three-wire:
 - 1) L-G: 700 V.
 - 2) N-G: 700 V.
 - 3) L-N: 700 V.
 - 4) L-L: 1200 V.
 - b. 120/240 V, high-leg, three-phase, four-wire:
 - 1) L-G: 1200 V.
 - 2) N-G: 800 V.
 - 3) L-N: 1200 V.
 - 4) L-L: 2000 V.
 - c. 208Y/120V, three-phase, four-wire:
 - 1) L-G: 700 V.
 - 2) N-G: 700 V.
 - 3) L-N: 700 V.
 - 4) L-L: 1200 V.
 - d. 480Y/277V, three-phase, four-wire:
 - 1) L-G: 1200 V.
 - 2) N-G: 1200 V.
 - 3) L-N: 1200 V.
 - 4) L-L: 2000 V.

H. Requirements for Category C SPDs:

1. Description: Integral or nipple-mounted units.

**SECTION 16483 – 6 SURGE PROTECTION FOR
LOW-VOLTAGE ELECTRICAL POWER CIRCUITS**

2. Inominal: 10kA.
3. Surge Current Rating: 40kA (per mode), 40kA (per phase) or higher.
4. SCCR: 200kA.
5. Protection for all applicable modes, differential (L-L, L-N) and common (L-G, N-G).
6. Voltage Protection Ratings not to exceed the following:
 - a. 120/240V, high-leg, single-phase, three-wire:
 - 1) L-G: 700 V.
 - 2) N-G: 700 V.
 - 3) L-N: 700 V.
 - 4) L-L: 1200 V.
 - b. 120/240 V, high-leg, three-phase, four-wire:
 - 1) L-G: 1200 V.
 - 2) N-G: 800 V.
 - 3) L-N: 1200 V.
 - 4) L-L: 2000 V.
 - c. 208Y/120V, three-phase, four-wire:
 - 1) L-G: 700 V.
 - 2) N-G: 700 V.
 - 3) L-N: 700 V.
 - 4) L-L: 1200 V.
 - d. 480Y/277V, three-phase, four-wire:
 - 1) L-G: 1200 V.
 - 2) N-G: 1200 V.
 - 3) L-N: 1200 V.

**SECTION 16483 – 7 SURGE PROTECTION FOR
LOW-VOLTAGE ELECTRICAL POWER CIRCUITS**

4) L-L: 2000 V.

I. Enclosures: SPDs not mounted integrally with the equipment shall be NEMA 4X rated.

2.2 SURGE PROTECTIVE DEVICES FOR DATA, SIGNALING AND CONTROL CIRCUITS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:

1. nVent ERICO.
2. Phoenix Contact.
3. Transtector.
4. Eaton, MTL.
5. RayCap.
6. Citel.

B. Description: Application specific surge protective devices used to protect low voltage ac and dc control, signaling and data circuits and related instrumentation.

C. Source Limitations: Obtain devices from a single source from a single manufacturer.

D. Standards: Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 497B for isolated loop communications circuits.

E. Bandwidth: All data, signaling and control circuit SPDs shall be selected by the CSI for the bandwidth and frequency requirements of the application.

F. SPDs for 4-20mA Current Loops:

1. Description: DIN-Rail mounted, Pluggable SPD modules for easy maintenance.
2. Performance Requirements:
 - a. MCOV: Not less than 125% of nominal system voltage.
 - b. Inominal: 5kA or higher.
 - c. I_{max}: 20kA.
 - d. Protection Modes: Differential and common.

- e. Voltage Protection Rating: 46V.
- G. SPDs for 4-20mA Remote Transmitter Protection:
 - 1. Description: Stainless steel enclosure threaded in-line with field conduit or to spare ¾" NPT threaded transmitter connection port or provided integral with instrumentation.
 - 2. Performance Requirements:
 - a. MCOV: Not less than 125% of nominal system voltage.
 - b. Inominal: 5kA or higher.
 - c. I_{max}: 20kA.
 - d. Protection Modes: Differential and common.
 - e. Voltage Protection Rating: 46V.
- H. SPDs for telecommunications circuits:
 - 1. Performance Requirements:
 - a. MCOV: Not less than 125% of nominal system voltage.
 - b. Inominal: 5kA.
 - c. I_{max}: 20kA.
 - d. Maximum Line Current: 300mA.
 - e. Voltage Protection Rating: Not to exceed 140 V.
- I. SPDs for Ethernet and POE:
 - 1. Standards:
 - a. Ethernet: Comply with IEEE 802.3af and 802.3av.
 - b. POE: Comply with IEEE 802.3at.
 - 2. Description: DIN-rail mounted surge protection for ethernet and POE applications.
 - 3. Performance Requirements:
 - a. Data Rate: 1000 Mbps.

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LOW-VOLTAGE ELECTRICAL POWER CIRCUITS**

- b. Inominal (L-L): 100A or higher.
 - c. Inominal (L-G): 2kA or higher.
 - d. I_{max}: 10kA or higher.
 - e. Connections: Shielded RJ45.
 - J. SPDs for RS-232/RS-485 protocols:
 - 1. Description: DIN-Rail mounted, Pluggable SPD modules for easy maintenance.
 - 2. Performance Requirements:
 - a. MCOV: Not less than 125% of nominal system voltage.
 - b. Inominal: 5kA.
 - c. Maximum Line Current: 600mA.
 - d. Voltage Protection Rating (8/20 μ S, 5kA): 40V.
 - K. SPDs for Radio Communications Systems:
 - 1. Description: Bulkhead lightning arrestors for protection of coaxial RF antenna systems suitable for frequencies from DC to 2.6GHz.
 - 2. Performance Requirements:
 - a. Insertion Loss: Less than or equal to 0.1 dB.
 - b. Standing Wave Ratio: Less than or equal to 1.15.
 - 3. CSI shall coordinate required input power ratings and system impedance as required.
- 2.3 ENCLOSURES
- A. Externally Mounted SPDs: NEMA 250, Type 4X.
- 2.4 CONDUCTORS AND CABLES
- A. Power Wiring: Same size as SPD leads, complying with Section 16119 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Provide OCPD and disconnect for installation of SPD in accordance with UL 1449 and manufacturer's written instructions.
- C. Install leads between disconnects and SPDs short, straight, twisted, and in accordance with manufacturer's written instructions. Comply with wiring methods in Section 16119 "Low-Voltage Electrical Power Conductors and Cables."
 - 1. Do not splice and extend SPD leads unless specifically permitted by manufacturer.
 - 2. Do not exceed manufacturer's recommended lead length.
 - 3. Install SPDs with leads as short as practicable. Integral and external units shall be installed as near as practicable to bus termination points.
 - 4. Do not bond neutral and ground.
- D. Use crimped connectors and splices only. Wire nuts are unacceptable.

3.2 FIELD QUALITY CONTROL

- A. Perform tests and inspections as specified in Section 16670 "Electrical Testing".

3.3 STARTUP SERVICE

- A. Complete startup checks in accordance with manufacturer's written instructions.
- B. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests; reconnect them immediately after the testing is over.
- C. Energize SPDs after power system has been energized, stabilized, and tested.

3.4 DEMONSTRATION

- A. Train Owner's maintenance personnel to operate and maintain SPDs.

END OF SECTION

SECTION 16519
LED INTERIOR LIGHTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes the following types of LED luminaires:

- 1. Cylinder.
- 2. Downlight.
- 3. Highbay, linear.
- 4. Highbay, nonlinear.
- 5. Linear industrial.
- 6. Lowbay.
- 7. Parking garage.
- 8. Recessed, linear.
- 9. Strip light.
- 10. Surface mount, linear.
- 11. Surface mount, nonlinear.
- 12. Suspended, linear.
- 13. Suspended, nonlinear.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."

- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Arrange in order of luminaire designation.
 - 2. Include data on features, accessories, and finishes.
 - 3. Include physical description and dimensions of luminaires.
 - 4. Include emergency lighting units, including batteries and chargers.
 - 5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
 - 6. Photometric data and adjustment factors based on laboratory tests, complying with IES "Lighting Measurements Testing and Calculation Guides" for each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project, IES LM-79 and IES LM-80.
 - a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products or a qualified independent testing agency.
- B. Shop Drawings: For nonstandard or custom luminaires.
 - 1. Include plans, elevations, sections, and mounting and attachment details.
 - 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.
- C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Luminaires.
 2. Suspended ceiling components.
 3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches of the plane of the luminaires.
 4. Structural members to which equipment and or luminaires will be attached.
 5. Structural members to which suspension systems for lighting fixtures will be attached.
 6. Initial access modules for acoustical tile, including size and locations.
 7. Items penetrating finished ceiling including, but not limited to, the following:
 - a. Other luminaires.
 - b. Air outlets and inlets.
 - c. Sprinklers.
 - d. Access panels.
 - e. Occupancy sensors.
 - f. Smoke and fire detectors.
 8. Moldings.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Product Certificates: For each type of luminaire.
- E. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.
- F. Quality Control: Source quality-control reports.
- G. Sample Warranty: For manufacturer's standard warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Drivers: One for every 10 of each type and rating installed. Furnish at least one of each type.
 2. Surge Protective Devices: Where a surge protective device is furnished by the manufacturer as an integral part of the Luminaire, provide one for every 10 of each type and rating installed. Furnish at least one of each type.
 3. Lamps/LED Modules: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
 4. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
 5. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provide laboratory qualifications for the testing laboratory used. Acceptable qualifications include the following:

1. Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products and complying with the applicable IES testing standards.
 2. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- 1.9 DELIVERY, STORAGE, AND HANDLING
- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.
- 1.10 WARRANTY
- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five years from date of Substantial Completion.
- C. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
1. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine (9) years.
 2. Warranty Period for Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries: Seven (7) years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six (6) years.

PART 2 PRODUCTS

2.1 LUMINAIRE SCHEDULE

- A. General requirements for all interior luminaires follow below. For specific requirements, reference the Luminaire Schedule included in the Electrical Plan Sheets of the Contract Documents.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."
- B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.
- C. Ambient Temperature: 41 to 104 deg F (or) 5 to 104 deg F.
- D. Relative Humidity: Zero to 95 percent.
- E. Altitude: Sea level to 3000 feet.

2.3 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter, shape, size, wattage, and coating.
 - c. CCT and CRI.
- C. Recessed luminaires shall comply with NEMA LE 4.
- D. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
- E. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

2.4 MATERIALS

- A. Metal Parts:

- B. Free of burrs and sharp corners and edges.
- C. Sheet metal components shall be steel unless otherwise indicated.
- D. Form and support to prevent warping and sagging.
- E. Steel:
 - 1. ASTM A36/A36M for carbon structural steel.
 - 2. ASTM A568/A568M for sheet steel.
- F. Stainless Steel:
 - 1. Manufacturer's standard grade.
 - 2. Manufacturer's standard type, ASTM A240/240M.
- G. Galvanized Steel: ASTM A653/A653M.
- H. Aluminum: ASTM B209.

2.5 METAL FINISHES

- A. Appearance of Finished Work: Noticeable variations in finish are not acceptable.

2.6 LUMINAIRE SUPPORT

- A. Comply with requirements in Section 16129 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12 gage.
- D. Rod Hangers: 3/16-inch minimum diameter, threaded stainless-steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

- A. Permanent luminaires shall not be used for temporary lighting.

3.3 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps or LED modules, drivers, surge protection devices and all other appurtenances required in each luminaire.
- D. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and relamping.
 - 3. Provide support for luminaire without causing deflection of ceiling or wall.
 - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- E. Flush-Mounted Luminaires:
 - 1. Secured to outlet box.
 - 2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
 - 3. Trim ring flush with finished surface.

- F. Wall-Mounted Luminaires:
 - 1. Attached to structural members in walls.
 - 2. Do not attach luminaires directly to gypsum board.
- G. Remote Mounting of Ballasts: Distance between the ballast and fixture shall not exceed that recommended by the ballast manufacturer. Verify, with ballast manufacturers, maximum distance between ballast and luminaire.
- H. Suspended Luminaires:
 - 1. Ceiling Mount:
 - a. Two 5/32-inch-diameter aircraft cable supports adjustable to 10 feet in length.
 - b. Four-point pendant mount with 5/32-inch-diameter aircraft cable supports adjustable to 10 feet in length.
 - c. Hook mount.
 - 2. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 3. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
 - 4. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
 - 5. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.
- I. Ceiling-Grid-Mounted Luminaires:
 - 1. Secure to any required outlet box.
 - 2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
 - 3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.
- J. Air-Handling Lighting Fixtures: Install with dampers closed and ready for adjustment.

- K. Comply with requirements in Section 16119 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 16153 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections as specified in Section 16670 "Electrical Testing".

3.6 STARTUP SERVICE

- A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in LED lamps intended to be dimmed, for at least 100 hours at full voltage.

3.7 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
 - 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
 - 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 3. Adjust the aim of luminaires in the presence of the Engineer.

END OF SECTION

SECTION 16539
LED EXTERIOR LIGHTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
- 2. Luminaire supports.
- 3. Luminaire-mounted photoelectric relays.

B. Related Requirements:

- 1. Section 16533 "Lighting Poles and Standards" for poles and standards used to support exterior lighting equipment.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of luminaire.
 - 1. Arrange in order of luminaire designation.
 - 2. Include data on features, accessories, and finishes.

3. Include physical description and dimensions of luminaire.
 4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.
 5. Photometric data and adjustment factors based on laboratory tests, complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project IES LM-79 and IES LM-80.
 - a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products or a qualified independent testing agency.
 6. Photoelectric relays.
- B. Shop Drawings:
1. Include plans, elevations, sections, and mounting and attachment details.
 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 3. Include diagrams for power, signal, and control wiring.
- C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Luminaires.
 2. Structural members to which equipment and luminaires will be attached.
 3. Underground utilities and structures.
 4. Existing underground utilities and structures.
 5. Above-grade utilities and structures.
 6. Existing above-grade utilities and structures.
 7. Building features.

8. Vertical and horizontal information.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
 - C. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 4. devices on which the certification is based and their installation requirements.
 - D. Product Certificates: For each type of the following:
 1. Luminaire.
 2. Photoelectric relay.
 - E. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.
 - F. Quality Control: Source quality-control reports.
 - G. Sample Warranty: For manufacturer's standard warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and photoelectric relays to include in operation and maintenance manuals.
 1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
 2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Drivers: One for every 10 of each type and rating installed. Furnish at least one of each type.
2. Surge Protective Devices: Where a surge protective device is furnished by the manufacturer as an integral part of the Luminaire, provide one for every 10 of each type and rating installed. Furnish at least one of each type.
3. Lamps/LED Modules: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
4. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
5. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provide laboratory qualifications for the testing laboratory used. Acceptable qualifications include the following:
 1. Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products and complying with the applicable IES testing standards.
 2. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.
- B. Provide luminaires from a single manufacturer for each luminaire type.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.10 FIELD CONDITIONS

- A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.
- B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.11 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including luminaire support components.
 - b. Faulty operation of luminaires and accessories.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 5 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 LUMINAIRE SCHEDULE

- A. General requirements for all exterior luminaires follow below. For specific requirements, reference the Luminaire Schedule included in the Electrical Plan Sheets in the Contract Documents.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."
- B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.

2.3 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp characteristics:

- a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter, shape, size, wattage and coating.
 - c. CCT and CRI for all luminaires.
- C. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.
- D. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- E. UL Compliance: Comply with UL 1598 and listed for wet location.
- F. Lamp base complying with ANSI C81.61.
- G. Bulb shape complying with ANSI C79.1.

2.4 MATERIALS

- A. Metal Parts: Free of burrs and sharp corners and edges.
- B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
- C. Housings:
 - 1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
 - 2. Provide filter/breather for enclosed luminaires.

2.5 FINISHES

- A. Appearance of Finished Work: Noticeable variations in finish are not acceptable.
- B. Comply with division 9.
- C. Luminaire Finish: Manufacturer's standard paint and color unless otherwise indicated on the Luminaire Schedule applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- D. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- E. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.

2.6 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 16129 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.
- C. Examine walls, roofs, canopy ceilings and overhang ceilings for suitable conditions where luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

- A. Permanent luminaires shall not be used for temporary lighting.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with NECA 1.
- B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Install lamps or LED modules, drivers, surge protection devices and all other appurtenances required in each luminaire.

- D. Fasten luminaire to structural support.
 - E. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and relamping.
 - 3. Support luminaires without causing deflection of finished surface.
 - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
 - F. Wall-Mounted Luminaire Support:
 - 1. Attached to structural members in walls.
 - G. Wiring Method: Install cables in raceways. Conceal raceways and cables.
 - H. Install luminaires level, plumb, and square with finished grade unless otherwise indicated.
 - I. Install luminaires at height and aiming angle as indicated on Drawings.
 - J. Coordinate layout and installation of luminaires with other construction.
 - K. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.
 - L. Comply with requirements in Section 160119 "Low-Voltage Electrical Power Conductors and Cables" and Section 16133 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.
- 3.4 CORROSION PREVENTION
- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- 3.5 IDENTIFICATION
- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 16153 "Identification for Electrical Systems."
- 3.6 FIELD QUALITY CONTROL
- A. Perform tests and inspections as specified in section 16670 "Electrical Testing".

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain luminaires and photocell relays.

3.8 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
 - 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
 - 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 3. Adjust the aim of luminaires in the presence of the Engineer.

END OF SECTION

SECTION 16541
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Photoelectric switches.
- 2. Indoor occupancy sensors.
- 3. Switchbox-mounted occupancy sensors.
- 4. Outdoor motion sensors.
- 5. Lighting contactors.

- B. Related Requirements:

- 1. Section 16426 "Wiring Devices" for wall-box dimmers, non-networkable wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings:

- 1. Show installation details for the following:
 - a. Occupancy sensors.
- 2. Interconnection diagrams showing field-installed wiring.
- 3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and elevations, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Suspended ceiling components.
 - 2. Structural members to which equipment will be attached.
 - 3. Items penetrating finished ceiling, including the following:
 - a. Luminaires.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Control modules.
- B. Field quality-control reports.
- C. Sample Warranty: For manufacturer's warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.
- B. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On USB media. Provide names, versions, and website addresses for locations of installed software.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Faulty operation of lighting control software.
 - b. Faulty operation of lighting control devices.
 - 2. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 PRODUCTS

2.1 OUTDOOR PHOTOELECTRIC SWITCHES, SOLID STATE, FLEXIBLE MOUNTING

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Eaton.
 - 2. Intermatic, Inc.
 - 3. Leviton Manufacturing Co., Inc.
 - 4. NSi Industries LLC.
- B. Description: Solid state, with SPST dry contacts rated for 1800 VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A, and compatible with ballasts and LED lamps.
 - 1. Listed and labeled as defined in NFPA 70, by an NRTL agency, and marked for intended location and application.
 - 2. Time Delay: Fifteen-second minimum, to prevent false operation.
 - 3. Surge Protection: Metal-oxide varistor.
 - 4. Mounting: Twist lock complies with ANSI C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure from same source and manufacturer as switch.
 - 5. Failure Mode: Luminaire stays ON.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES, SOLID STATE, LUMINAIRE-MOUNTED

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Eaton.
 - 2. Intermatic, Inc.
 - 3. Leviton Manufacturing Co., Inc.
 - 4. NSi Industries LLC.
- B. Description: Solid state, with SPST dry contacts rated for 1800 VA inductive, to operate connected load, complying with UL 773, and compatible with CFL and LED lamps.
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Time Delay: Thirty-second minimum, to prevent false operation.
 - 3. Lightning Arrester: Air-gap type.
 - 4. Mounting: Twist lock complying with ANSI C136.10, with base from same source and manufacturer as switch.
 - 5. Failure Mode: Luminaire stays ON.

2.3 INDOOR OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Eaton.
 - 2. Lutron Electronics Co., Inc.
 - 3. Hubbell Incorporated (Hubbell Control Solutions).
- B. General Requirements for Sensors:
 - 1. Wall-mounted, ceiling-mounted or integral with the fixture as indicated on the drawings, solid-state indoor occupancy and vacancy sensors.
 - 2. Passive infrared technology.

3. Separate power pack.
 4. Wireless communication with switch/fixtures; and BAS and lighting control system.
 5. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 6. Operation:
 - a. Occupancy Sensor: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 7. Sensor Output: Wireless.
 8. Power: Line voltage.
 9. Power Pack: Dry contacts rated for 20-A LED load at 120- and 277-V ac and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
 10. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 11. Bypass Switch: Override the "on" function in case of sensor failure.
 12. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.
- C. PIR Type: Detect occupants in coverage area by their heat and movement.
1. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in.
 2. Detection Coverage (Room, Ceiling Mounted): Detect occupancy anywhere in a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.
 3. Detection Coverage (Corridor, Ceiling Mounted): Detect occupancy within 90 feet when mounted on a 10-foot-high ceiling.

4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of 1000 square feet when mounted 48 inches above finished floor.

2.4 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. Eaton.
 2. Lutron Electronics Co., Inc.
 3. Hubbell Incorporated (Hubbell Control Solutions).
- B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox using wireless connection for controls and hardwired for power.
 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time-delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
 4. Switch Rating: Not less than 800-VA LED load at 120 V, 1200-VA LED load at 277 V.

2.5 OUTDOOR MOTION SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Cooper Industries, Inc.
 2. Hubbell Incorporated (Hubbell Control Solutions).
 3. Leviton Manufacturing Co., Inc.
- B. Description: Solid-state outdoor motion sensors.
 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. PIR type, weatherproof. Detect occurrences of 6-inch-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. Comply with UL 773A.
3. Switch Rating:
 - a. Luminaire-Mounted Sensor: Dry contacts rate for 20-A LED load at 120- and 277-V ac and for 1 hp at 120-V ac. Sensor has 24 Vdc.
 - b. Separately Mounted Sensor: Dry contacts rated for 20-A LED load at 120- and 277-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
4. Switch Type: SP.
5. Voltage: Match the circuit voltage.
6. Detector Coverage:
 - a. Standard Range: 210-degree field of view, with a minimum coverage area of 900 sq. ft.
 - b. Long Range: 180-degree field of view and 110-foot detection range.
7. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
8. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
9. Operating Ambient Conditions: Suitable for operation in ambient temperatures ranging from minus 40 to plus 130 deg F, rated as "raintight" according to UL 773A.

2.6 COMBINATION PHOTOCELL MOTION SENSOR

- A. Outdoor Motion Sensor with Photocell.
 1. 120VAC line voltage control.
 2. Cast aluminum construction.
- B. RAB Lighting, Model STL360 or equal.

2.7 LIGHTING CONTACTORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. ABB (Electrification Products Division).
 - 2. Allen-Bradley/Rockwell Automation.
 - 3. ASCO: a brand of Vertiv.
 - 4. Eaton.
 - 5. Leviton Manufacturing Co., Inc.
 - 6. Schneider Electric USA (Square D).
- B. Description: Electrically operated and electrically held, combination-type lighting contactors with-nonfused disconnect, complying with NEMA ICS 2 and UL 508.
 - 1. Current Rating for Switching: Listing or rating consistent with type of load served.
 - 2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
 - 3. Enclosure: Comply with NEMA 250.
 - 4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.
- B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SENSOR INSTALLATION

- A. Comply with NECA 1.

- B. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- C. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.3 CONTACTOR INSTALLATION

- A. Comply with NECA 1.
- B. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.4 WIRING INSTALLATION

- A. Comply with NECA 1.
- B. Wiring Method: Comply with Section 16119 "Low-Voltage Electrical Power Conductors and Cables." for conductors and Sections 16133, 16136 and 16143 as required for raceways.
- C. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- D. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.5 IDENTIFICATION

- A. Identify components and power and control wiring according to Section 16153 "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections as specified in Section 16670 "Electrical Testing".

3.7 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
 - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
 - 2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
 - 3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.8 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 - 1. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

3.9 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION

**SECTION 16670
ELECTRICAL TESTING**

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Electrical test and inspection requirements for all electrical equipment, motors, instruments and components.

1.3 GENERAL DESCRIPTION OF WORK

- A. General: Provide testing of electrical work installed under division 16, as specified herein and in other Division 16 sections. Feeders and equipment shall not be placed in service until they have been checked out and tested, as applicable.
- B. The following will be tested as indicated in this section:
 - 1. Transformers.
 - 2. Distribution and motor feeders.
 - 3. Molded-case circuit breakers.
 - 4. Instrument transformers.
 - 5. Metering devices.
 - 6. Grounding systems.
 - 7. Ground fault system.
 - 8. Motors.
 - 9. Motor Controls, Motor Starters and Motor Control Centers.
 - 10. Adjustable speed drives.
 - 11. Surge Protective Devices.
 - 12. Automatic transfer switches.

13. Fiber optic cable.
14. Conductors.
15. System Function.

1.4 QUALITY ASSURANCE

A. Qualifications of the testing organization and personnel:

1. Testing Organization:

- a. The testing organization shall be an independent, third party entity which can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of equipment or systems being evaluated.
- b. The testing organization shall be regularly engaged in the testing of electrical equipment devices, installations, and systems.
- c. The testing organization shall use technicians who are regularly employed for testing services.
- d. The testing organization shall submit appropriate documentation to demonstrate that it satisfactorily complies with these requirements.

2. Testing Personnel:

- a. Technicians performing these electrical tests and inspections shall be trained and experienced concerning the apparatus and systems being evaluated. These individuals shall be capable of conducting the tests in a safe manner and with complete knowledge of the hazards involved. They must evaluate the test data and make a judgment on the serviceability of the specific equipment.
- b. Technicians shall be certified in accordance with ANSI/NETA ETT-2000, Standard for Certification of Electrical Testing Personnel. Each on-site crew leader shall hold a current certification, Level III or higher, in electrical testing.

- ##### B. The Engineer reserves the right to require that the originally approved personnel be replaced with other qualified personnel if, in his opinion, the original personnel are not qualified or are not properly conducting the system testing.

1.5 DIVISION OF RESPONSIBILITY

A. The Owner's Representative:

1. The Owner's representative shall provide the testing organization with the following:
 - a. A complete set of electrical plans and specifications, including all change orders.
 - b. Drawings and instruction manuals applicable to the scope of work.
 - c. An itemized description of equipment to be inspected and tested.
 - d. A determination of who shall provide a suitable and stable source of electrical power to each test site.
 - e. A determination of who shall perform certain preliminary low-voltage insulation-resistance, continuity, and/or low-voltage motor rotation tests prior to and in addition to tests specified herein.
 - f. Notification of when equipment becomes available for acceptance tests. Work shall be coordinated to expedite project scheduling.
 - g. Site-specific hazard notification and safety training.
2. The testing organization shall provide the following:
 - a. All field technical services, tooling, equipment, instrumentation, and technical supervision to perform such tests and inspections.
 - b. Specific power requirements for test equipment.
 - c. Notification to the user prior to commencement of any testing.
 - d. A timely notification of any system, material, or workmanship that is found deficient based on the results of the acceptance tests.
 - e. A written record of all tests and a final report.

1.6 SAFETY AND PRECAUTIONS

- A. All parties involved must be cognizant of applicable safety procedures. This document does not include any procedures, including specific safety procedures. It is recognized that an overwhelming majority of the tests and inspections recommended in these specifications are potentially hazardous. Individuals performing these tests shall be capable of conducting the tests in a safe manner and with complete knowledge of the hazards involved.
- B. Safety practices shall include, but are not limited to, the following requirements:

1. All applicable provisions of the Occupational Safety and Health Act, particularly OSHA 29CFR 1910.
 2. Accident Prevention Manual for Industrial Operations, National Safety Council.
 3. Applicable state and local safety operating procedures.
 4. Owner's safety practices.
 5. ANSI/NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces.
- C. A safety lead person shall be identified prior to commencement of work.
- D. A safety briefing shall be conducted prior to the commencement of work.
- E. All tests shall be performed with the apparatus de-energized and grounded except where otherwise specifically required to be ungrounded or energized for certain tests.
- F. The testing organization shall have a designated safety representative on the project to supervise operations with respect to safety. This individual may be the same person described in 1.5.A.2.

1.7 SUITABILITY OF TEST EQUIPMENT

- A. All test equipment shall meet the requirements in Section 1.8 and be in good mechanical and electrical condition.
- B. Field test metering used to check power system meter calibration must be more accurate than the instrument being tested.
- C. Accuracy of metering in test equipment shall be appropriate for the test being performed. Wave shape and frequency of test equipment output waveforms shall be appropriate for the test and the tested equipment.

1.8 TEST INSTRUMENT CALIBRATION

- A. Testing organization shall have a calibration program which assures that all applicable test instruments are maintained within rated accuracy for each test instrument calibrated.
- B. The firm providing calibration service shall maintain up to date instrument calibration instructions and procedures for each test instrument calibrated.
- C. The accuracy shall be directly traceable to the National Institute of Standards and Technology (NIST).
- D. Instruments shall be calibrated in accordance with the following frequency schedule:

1. Field instruments: Analog, 6 months maximum. Digital, 12 months maximum.
 2. Laboratory instruments: 12 months maximum.
 3. Leased specialty equipment: 12 months maximum.
- E. Dated calibration labels shall be visible on all test equipment.
- F. Records, which show date and results of instruments calibrated or tested, must be kept up to date.
- G. Calibrating standard shall be of better accuracy than that of the instrument tested.

1.9 ACTION SUBMITTALS

- A. General: Notify the Engineer in writing two weeks prior to all scheduled testing to allow time for Engineer to schedule witnessing of testing, where elected by Engineer.
- B. Testing Procedures: Submit four physical copies or an electronic PDF of all proposed testing procedures to the Engineer for review at least 30 days prior to conducting any testing on the project.
- C. Calibration List: Submit four physical copies or an electronic PDF listing all testing devices to be used for the project to the Engineer for approval. Listing shall include documentation that the devices are properly calibrated.
- D. Reporting Forms: Submit four physical copies or an electronic PDF of all proposed forms to be used in recording testing data and results to the Engineer for review at least 30 days prior to conducting any testing on the project.
- E. Test Data and Results: Submit four physical copies or an electronic PDF of complete data and certified test results for each test performed, including, but not limited to:
1. Test performed.
 2. Test procedure.
 3. System and area tested.
 4. Date(s) and time(s) of test.
 5. Weather conditions.
 6. Test criteria.
 7. Test results.
 8. Additional pertinent information.

1.10 INFORMATIONAL SUBMITTALS

- A. Operational Certification: Submit four certified copies of an operational certification which documents that all equipment and systems have been fully tested to verify proper operation in accordance with the design shown in the Contract documents and manufacturer's recommendations.
- B. Certification: Certifications stating that submitted test data and results are true and correct shall be provided for all submittals under this section. Certification shall be executed by an authorized officer if the Contractor is a corporation, by a partner if the Contractor is a partnership, by the owner if the Contractor is a sole proprietorship or by the authorized representative if the Contractor is a joint venture.
- C. Test Log: The Contractor shall maintain a test log at the site to document the results of all successful and unsuccessful testing and balancing as it is performed. This log shall be available for review by the Engineer and a copy of the log shall be submitted to the Engineer prior to the Substantial Completion inspection. A space shall be provided on the test log signoff by the Engineer or Owners representative.

1.11 CLOSEOUT SUBMITTALS

- A. Submit a comprehensive final test report after all testing has been completed and before final acceptance of the project.
- B. The test report shall include the following:
 - 1. Summary of project.
 - 2. Description of equipment tested.
 - 3. Description of tests.
 - 4. Test data.
 - 5. Analysis and recommendations.
- C. Test data records shall include the following minimum requirements:
 - 1. Identification of the testing organization.
 - 2. Equipment identification.
 - 3. Humidity, temperature, and other conditions that may affect the results of the tests and/or calibrations.
 - 4. Date of inspections, tests, maintenance, and/or calibrations.
 - 5. Identification of the testing technician.

6. Indication of inspections, tests, maintenance, and/or calibrations to be performed and recorded.
 7. Indication of expected results when calibrations are to be performed.
 8. Indication of “as-found” and “as-left” results, as applicable.
 9. Sufficient spaces to allow all results and comments to be indicated.
- D. The testing organization shall furnish a copy or copies of the complete report to the owner as specified in the acceptance testing contract.

1.12 TESTING FORMS

- A. The Contractor is responsible for providing all required testing forms. For convenience, the following test forms have been included at the end of this Section:
1. Electrical System Test Report
 2. Electrical Ground Rod Test Report
 3. Motor Data and Test Report.
 4. Instrument Test Report.

PART 2 PRODUCTS

2.1 GENERAL:

- A. Provide all materials and test equipment required for testing of specified electrical systems, including re-testing until acceptable results are obtained.

2.2 PRODUCTS:

- A. Tested products which fail to provide acceptable test results shall be repaired or replaced with suitable materials as required to obtain acceptable results.

PART 3 EXECUTION

3.1 TESTING

- A. General: Tests shall be conducted during construction as specified by these Specifications and as required by authorities having jurisdiction.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Scope:

1. The Contractor shall provide all material, equipment, labor and technical supervision to perform tests and inspections as specified herein.
2. It is the intent of these tests to ensure that all electrical equipment is operational within the industry and manufacturer's tolerances and is installed in accordance with the Contract Documents.
3. The tests and inspections shall determine the suitability of the system for energization.
4. If the test results indicate corrective measures are required, the Contractor shall undertake all such corrective measures. No additional compensation will be paid for corrective measures.

3.2 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

- A. Perform grounding tests and inspections before backfilling or pouring of concrete.
- B. Tests and Inspections:
 1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 3. Tests completed grounding system at service disconnect enclosure grounding terminal, at ground test wells and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 4. Prepare dimensioned drawings, locating each test well, ground rod and ground-rod assembly., and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- C. Grounding system will be considered defective if it does not pass tests and inspections.

- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 Ohms.
 - 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 Ohms.
 - 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 Ohms.
 - 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 Ohms.
 - 5. Substations and Pad-Mounted Equipment: 5 Ohms.
 - 6. Manhole Grounds: 10 Ohms.
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify the Engineer promptly and include recommendations to reduce ground resistance.

3.3 LOW-VOLTAGE DISTRIBUTION TRANSFORMERS

- A. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test state in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Small (Up to 167-kVA Single-Phase or 500-kVA Three-Phase) Dry-Type Transformer Field Tests:
 - a. Visual and Mechanical Inspection:
 - 1) Inspect physical and mechanical condition.
 - 2) Inspect anchorage, alignment and grounding.
 - 3) Verify that resilient mounts are free and that any shipping brackets have been removed.
 - 4) Verify the unit is clean.
 - 5) Perform specific inspections and mechanical tests recommended by manufacturer.
 - 6) Verify that as-left tap connections are as specified.

- 7) Verify the presence of surge arresters and that their ratings are as specified.
 - b. Electrical Tests:
 - 1) Measure resistance at each winding, tap and bolted connection.
 - 2) Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply voltage according to manufacturer's published data, comply with NETA ATS, Table 100.5. Calculate polarization index. The value of the index shall not be less than 1.0.
 - 3) Perform turns-ratio tests at all tap positions. Test results shall not deviate by more than one-half percent from either the adjacent coils or the calculated ratio. If test fails, replace the transformer.
 - 4) Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.
3. Large (Larger than 167-kVA Single-Phase or 500-kVA Three-Phase) Dry-Type Transformer Field Tests:
- a. Visual and Mechanical Inspection:
 - 1) Inspect physical and mechanical condition.
 - 2) Inspect anchorage, alignment and grounding.
 - 3) Verify that resilient mounts are free and that any shipping brackets have been removed.
 - 4) Verify the unit is clean.
 - 5) Perform specific inspections and mechanical tests recommended by manufacturer.
 - 6) Verify that as-left tap connections are as specified.
 - 7) Verify the presence of surge arresters and that their ratings are as specified.
 - b. Electrical Tests:
 - 1) Measure resist at each winding, tap and bolted connection.
 - 2) Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply voltage according to manufacturer's

published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5. Calculate polarization index. The value of the index shall not be less than 1.0.

- 3) Perform power-factor or dissipation-factor tests on all windings.
 - 4) Perform turns-ratio tests at all tap positions. Test results shall not deviate by more than one-half percent from either the adjacent coils or the calculated ratio. If test fails, replace the transformer.
 - 5) Perform an excitation-current test on each phase.
 - 6) Perform an applied voltage test on all high- and low-voltage windings to ground. See IEEE C57.12.91, Sections 10.2 and 10.9.
 - 7) Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.
4. Remove and replace units that do not pass tests or inspections and retest as specified above.
 5. Infrared Scanning: Two months after Substantial Completion, perform an infrared scan of transformer connections.
 - a. Use an infrared-scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.
 - b. Perform two follow-up infrared scans of transformers, one at four months and the other at 11 months after Substantial Completion.
 - c. Prepare a certified report identifying transformer checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and scanning observations after remedial action.
 6. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.
- B. Visual and Mechanical Inspection:
1. Compare equipment nameplate data with drawings and specifications.
 2. Inspect physical and mechanical condition.
 3. Inspect anchorage, alignment, and grounding.
 4. Verify that resilient mounts are free and that any shipping brackets have been removed.

5. Verify the unit is clean.
6. Inspect bolted electrical connections for high resistance using one of the following methods:
 - a. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or Table 100.12.

C. Electrical Tests:

1. Perform insulation-resistance tests winding to winding and each winding to ground with test voltage in accordance with Table 100.5. Calculate dielectric absorption ratio or polarization index.

3.4 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

A. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors feeding the following critical equipment and services for compliance with requirements:

1. All 480V power feeders scheduled in the Conduit & Wire Schedule.
2. Service feeder and pump feeder power cabling.
3. Motor feeders.

B. Perform each of the following visual and electrical tests:

1. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
2. Test bolted connections for high resistance using one of the following.
 - a. A low-resistance ohmmeter.
 - b. Calibrated torque wrench.
 - c. Thermographic survey.
3. Inspect compression-applied connectors for correct cable match and indentation.
4. Inspect for correct identification.
5. Inspect cable jacket and condition.

6. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
 7. Continuity test on each conductor and cable.
 8. Uniform resistance of parallel conductors.
- C. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 2. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- D. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
- E. Perform voltage, current and resistance tests as required to complete the Electrical System Test Report form included in this specification section. Test reports must be submitted to the Engineer prior to start up. The Contractor shall inform the Engineer when testing is taking place a minimum of 5 days in advance. Testing shall not take place unless the Engineer or other Owner representative is present to witness the testing.
- F. Cables will be considered defective if they do not pass tests and inspections.
- G. Prepare test and inspection reports to record the following:
1. Procedures used.
 2. Results that comply with requirements.
 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- H. Remove and replace malfunctioning wires and cables and retest and specified above.
- I. Test Values:
1. Compare bolted connection resistances to values of similar connections.

2. Bolt-torque levels should be in accordance with Table 100.12 unless otherwise specified by the manufacturer.
3. Microhm or millivolt drop values shall not exceed the high levels of the normal range as indicated in the manufacturer's published data. If manufacturer's data is not available, investigate any values which deviate from similar connections by more than 50 percent of the lowest value.
4. Insulation-resistance values should not be less than 50 megohms.
5. Investigate deviations in resistance between parallel conductors.

3.5 CONTROL-VOLTAGE ELECTRICAL POWER CABLES

A. Tests and Inspections:

1. Visually inspect cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination, but not after cross-connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in its "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in its "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

B. End-to-end cabling will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 CABLE TRAYS FOR ELECTRICAL SYSTEMS

A. Tests and inspections:

1. After installing cable trays and after electrical circuitry has been energized, survey for compliance with requirements.

2. Visually inspect cable insulation for damage. Correct sharp corners, protuberances in cable trays, vibrations and thermal expansion and contraction conditions, which may cause or have caused damage.
3. Verify that the number, size and voltage of cables in cable trays do not exceed that permitted by NFPA 70. Verify that communications or data-processing circuits are separated from power circuits by barriers or are installed in separate cable trays.
4. Verify that there are no intruding items, such as pipes, hangers or other equipment, in the cable tray.
5. Remove dust deposits, industrial process materials, trash of any description, and any blockage of tray ventilation.
6. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and retorque in suspect areas.
7. Check for improperly sized or installed bonding jumpers,
8. Check for missing, incorrect or damaged bolts, bolt heads or nuts. When found, replace with specified hardware.
9. Perform visual and mechanical checks for adequacy of cable tray grounding; verify that all takeoff raceways are bonded to cable trays. Test entire cable tray system for continuity. Maximum allowable resistance is 1 Ohm.

B. Prepare test and inspection reports.

3.7 UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

A. Tests and Inspections:

1. Demonstrate capability and compliance with requirements on completion of installation of underground duct, duct bank and utility structures.
2. Pull solid aluminum or wood test mandrel through duct to prove joint integrity, adequate bend radii, and test for out-of-round duct. Provide a minimum 12-inch long mandrel equal to duct size minus 1/4-inch. If obstructions are indicated, remove obstructions and retest.
3. Clean conduits by drawing a brush with stiff bristles and a swab through each duct and conduit to make certain that no foreign materials are left in the conduit. Cleaning and mandrel operations may be performed simultaneously.

4. Test manhole and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in paragraph 3.2 of this Section.
- B. Correct deficiencies and retest as specified above to demonstrate compliance.
- C. Prepare test and inspection reports.

3.8 SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

- A. Tests and Inspections:
 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 2. Schedule test with Owner, through Engineer, before connecting anchorage device to restrained component (unless post connection testing has been approved), and with at least seven days' advance notice.
 3. Obtain Engineer's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 4. Test at least four of each type and size of installed anchors and fasteners selected by Engineer.
 5. Test to 90 percent of rated proof load of device.
- B. Seismic controls will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.9 MOTORS

- A. Tests and Inspections:
 1. The Contractor shall simulate all motor alarm and shutdown conditions to test that the motor control is operating correctly. These tests shall be witnessed and verified by the Engineer.
 2. The Contractor shall perform voltage, current and resistance tests as required to complete the Motor Test Report form included herein. The Contractor shall inform the Engineer a minimum of 3 days in advance of testing and shall only perform tests with the Engineer or Owners representative present.
 - a. Voltage, current and circuit and winding resistance readings shall be taken with a volt-ohm meter.

- b. Insulation resistance readings shall be taken with a 500V megger for 30 seconds with the circuit conductors connected to the motor.
- B. Test reports must be submitted to the Engineer prior to final acceptance by the Owner.
- C. If the test results indicate corrective measures are required, the Contractor shall undertake all such corrective measures until the electrical system is accepted by the Engineer. No additional compensation will be paid for corrective measures.

3.10 ELECTRIC ACTUATORS

- A. Tests and Inspections:
 - 1. The Contractor shall perform voltage, current and resistance tests as required to complete the Motor Test Report. The Contractor shall inform the Engineer a minimum of 3 days in advance of testing and shall only perform tests with the Engineer or Owner's representative present.
- B. Test reports must be submitted to the Engineer prior to final acceptance by the Owner.
- C. If the test results indicate corrective measured are required, the Contractor shall undertake all such corrective measures until the electrical system is accepted by the Engineer. No additional compensation will be paid for corrective measures.

3.11 PANELBOARDS

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers and low-voltage surge arrestors stated in NETA ATS, Paragraph 7.6 Circuit Breakers and Paragraph 7.19.1 Surge Arrestors, Low-Voltage. Do not perform optional tests. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
 - c. Instruments and Equipment:
 - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- D. Panelboards will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.12 MOTOR-CONTROL CENTERS

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Factory Acceptance Testing:
 1. The motor control center shall be tested in the CSI's shop along with the Control System per the requirements in this section and 16928. Operation of the motor control center shall be tested in the shop by the Control System Integrator. The testing shall include, but not be limited to, operation of all input and output (I/O) points, control devices and motor controllers 24 hours per day for a continuous period of at least one (1) week.
- C. Acceptance Testing Preparation:
 1. Test insulation resistance for each enclosed controller, component, connecting supply, feeder and control circuit.
 2. Test continuity of each circuit.
- D. Tests and Inspections:

1. Inspect controllers, wiring, components, connections and equipment installation. Test and adjust controllers, components and equipment as required.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Test insulation resistance for each enclosed controller, component, connecting supply, feeder and control circuit.
4. Test continuity of each circuit.
5. Verify that voltages at controller locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Engineer before starting the motor(s).
6. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
7. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
8. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
9. Perform the following infrared (thermographic) scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each multipole enclosed controller. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each multipole enclosed controller 11 months after date of Substantial Completion.
 - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Submit calibration record for device.
10. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
11. Mark up a set of manufacturer's drawings with all field modifications incorporated during construction and return to manufacturer for inclusion in Record Drawings.

- E. MCC components will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports, including a certified report that identifies enclosed controllers and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

3.13 WIRING DEVICES

- A. Test Instruments: Use instruments that comply with UL 1436.
- B. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- C. Perform the following tests and inspections:
 - 1. In healthcare facilities, prepare reports that comply with NFPA 99.
 - 2. Test Instruments: Use instruments that comply with UL 1436.
 - 3. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- D. Tests for Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault-current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- E. Test straight-blade hospital-grade outlets for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz.
- F. Wiring device will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.

3.14 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

A. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

- a. Inspect physical and mechanical condition.
- b. Inspect anchorage, alignment, grounding and clearances.
- c. Verify that the unit is clean.
- d. Verify blade alignment, blade penetration, travel stops and mechanical operation.
- e. Verify that fuse sizes and types match the Specifications and Drawings.
- f. Verify that each fuse has adequate mechanical support and contact integrity.
- g. Inspect bolted electrical connections for high resistance using one of the two following methods:
 - 1) Use a low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
- h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
- i. Verify correct phase barrier installation.
- j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

- a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compared bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
- b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
- c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
- d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
- e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."

B. Tests and Inspections for Molded Case Circuit Breakers:

1. Visual and Mechanical Inspection:

- a. Verify that equipment nameplate data is as described in the Specifications and shown on the Drawings.
- b. Inspect physical and mechanical condition.
- c. Inspect anchorage, alignment, grounding, and clearances.
- d. Verify that the unit is clean.
- e. Operate the circuit breaker to ensure smooth operation.
- f. Inspect bolted electrical connections for high resistance using one of the two following methods:
 - 1) Use a low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate

from those of similar bolted connections by more than 50 percent of the lowest value.

- 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

- a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

- g. Inspect operating mechanism, contacts, and chutes in unsealed units.
 - h. Perform adjustments for final protective device settings in accordance with the coordination study.

2. Electrical Tests:

- a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
 - c. Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - d. Perform insulation resistance tests on all control wiring with respect to ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration shall be one minute. For units with solid state components, follow manufacturer's recommendation. Insulation resistance values shall be no less than two megohms.
 - e. Determine the following by primary current injection:

- 1) Long-time pickup and delay. Pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
 - 2) Short-time pickup and delay. Short-time pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
 - 3) Ground-fault pickup and time delay. Ground-fault pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
 - 4) Instantaneous pickup. Instantaneous pickup values shall be as specified and within manufacturer's published tolerances.
- f. Test functionality of the trip unit by means of primary current injection. Pickup values and trip characteristics shall be as specified and within manufacturer's published tolerances.
 - g. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of the shunt trip and close coils shall be as indicated by manufacturer.
 - h. Verify correct operation of auxiliary features such as trip and pickup indicators; zone interlocking; electrical close and trip operation; trip-free, anti-pump function; and trip unit battery condition. Reset all trip logs and indicators. Investigate units that do not function as designed.
 - i. Verify operation of charging mechanism. Investigate units that do not function as designed.
3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 4. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.

- c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- 5. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.
 - 1. Test procedures used.
 - 2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
 - 3. List deficiencies detected, remedial action taken, and observations after remedial action.

3.15 MANUAL AND MAGNETIC MOTOR CONTROLLERS

- A. Tests and Inspections:
 - 1. Comply with the provisions of NFPA 70B, "Testing and Test Methods" Chapter.
 - 2. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with drawings and specifications.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment and grounding.
 - d. Verify the unit is clean.
 - e. Inspect contactors:
 - 1) Verify mechanical operation.
 - 2) Verify contact gap, wipe, alignment and pressure ar according to manufacturer's published data.
 - f. Motor-Running Protection:
 - 1) Verify overload element rating is correct for its application.

- 2) If motor-running protection is provided by fuses, verify correct fuse rating.
 - g. Inspect bolted electrical connections for high resistance using one of the two following methods.
 - 1) Use a low-resistance ohmmeter. Compare bolted connection resistance values with values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS Table 100.12. Bolt-torque levels shall be according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
 - h. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
3. Electrical Tests:
- a. For the contactor and circuit breaker, perform insulation and resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Insulation resistance values shall be according to manufacturer's published data or NETA ATS Table 100.1. In the absence of manufacturer's data, use Table 100.5. Values of insulation resistance less than those of this table or manufacturer's recommendations shall be investigated and corrected.
 - b. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
 - c. Test motor protection devices according to manufacturer's published data.
 - d. Test circuit breakers as follows:
 - 1) Operate the circuit breaker to ensure smooth operation.
 - 2) For adjustable circuit breakers, adjust protective device settings according to the coordination study. Comply with coordination study recommendations.
 - e. Perform operational tests by initiating control devices.
4. Infrared Inspection: Perform the survey during periods of maximum possible loading. Remove all necessary covers prior to the inspection.

- a. Comply with the recommendations of NFPA 70B, "Testing and Test Methods" Chapter, "Infrared Inspection" Article.
 - b. After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared inspection of the electrical power connections of each motor controller.
 - c. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each motor controller 11 months after date of Substantial Completion.
 - d. Report of Infrared Inspection: Prepare a certified report that identifies the testing technician and equipment used, and lists the following results:
 - 1) Description of equipment to be tested.
 - 2) Discrepancies.
 - 3) Temperature difference between the area of concern and the reference area.
 - 4) Probable cause of temperature difference.
 - 5) Areas inspected. Identify inaccessible and unobservable areas and equipment.
 - 6) Load conditions at time of inspection.
 - 7) Photographs and thermograms of the deficient area.
 - 8) Recommended action.
 - e. Equipment: Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1 deg C at 30 deg C. The equipment shall detect emitted radiation and convert detected radiation to a visual signal.
 - f. Act on inspection results and recommended action, and considering the recommendations of NETA ATS, Table 100.18. Correct possible and probable deficiencies as soon as Owner's operations permit. Retest until deficiencies are corrected.
5. System Function Tests:
- a. System function tests shall prove the correct interaction of sensing, processing, and action devices. Perform system function tests after field quality control tests have been completed and all components have passed specified tests.

- 1) Develop test parameters and perform tests for the purpose of evaluating performance of integral components and their functioning as a complete unit within design requirements and manufacturer's published data.
- 2) Verify the correct operation of interlock safety devices for fail-safe functions in addition to design function.
- 3) Verify the correct operation of sensing devices, alarms, and indicating devices.

B. Motor controller will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.16 SOFT-START MOTOR CONTROLLERS

A. Tests and Inspections:

1. Comply with provisions of NFPA 70B, Chapter "Testing and Test Methods."
2. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with Drawings and the Specifications.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment, and grounding.
 - d. Verify that the unit is clean.
 - e. Ensure that vent path openings are free from debris and that heat-transfer surfaces are clean.
 - f. Verify correct connections of circuit boards, wiring, disconnects, and ribbon cables.
 - g. Inspect Contactors:
 - 1) Verify mechanical operation.
 - 2) Verify that contact gap, wipe, alignment, and pressure are according to manufacturer's published data.
 - h. Motor-Running Protection:
 - 1) Verify that motor FLA is at, or under, the controller current rating.

- 2) Verify that overload element setting is correct for its application.
 - 3) Apply minimum- and maximum-speed set points. Verify that set points are within limitations of the load coupled to the motor.
 - 4) If motor-running protection is provided by fuses, verify correct fuse rating.
- i. Inspect bolted electrical connections for high resistance using one of the following two methods:
- 1) Use a low-resistance ohmmeter. Compare bolted-connection-resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS, Table 100.12. Bolt-torque levels shall be according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS, Table 100.12.
- j. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
3. Electrical Tests:
- a. For the contactor and circuit breaker, perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Insulation-resistance values shall be according to manufacturer's published data or NETA ATS, Table 100.1. In the absence of manufacturer's published data, use Table 100.5. Values of insulation resistance less than this table or manufacturer's written instructions shall be investigated and corrected.
 - b. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
 - c. Test motor protection devices according to manufacturer's published data.
 - d. Test circuit breakers as follows:
 - 1) Operate the circuit breaker to ensure smooth operation.

- 2) For adjustable circuit breakers, adjust protective device settings according to the coordination study. Comply with coordination study recommendations.
- e. Test the electronic motor overload relay elements by injecting primary current through the overload circuit and monitoring trip time of the overload element.
- f. Test the following parameters according to NETA relay calibration procedures, or as recommended by manufacturer:
 - 1) ANSI No. 49R, Overtemperature Protection:
 - a) Determine time delay at 300 percent of setting.
 - b) Determine a second point on the operating curve.
 - c) The pickup determination in first subparagraph below is normally considered an optional field test.
 - d) Determine pickup.
 - 2) ANSI No. 47, Input Phase Loss and Reversed Phases Protection:
 - a) Determine positive sequence voltage to close the NO contact.
 - b) Determine positive sequence voltage to open the NC contact (undervoltage trip).
 - c) Verify negative sequence trip.
 - d) Determine time delay to close the NO contact with sudden application of 120 percent of pickup.
 - e) Determine time delay to close the NC contact on removal of voltage when previously set to rated system voltage.
 - 3) ANSI No. 81, Overfrequency Protection:
 - a) Verify frequency set points.
 - b) Determine time delay.
 - c) Determine undervoltage cutoff.

- 4) Fault Alarm Outputs: Verify that each relay contact performs its intended function in the control scheme including breaker trip tests, close inhibit tests, lockout tests, and alarm functions.
 - g. Perform operational tests by initiating control devices.
4. Infrared Inspection: Perform the survey during periods of maximum possible loading. Remove all necessary covers prior to the inspection.
- a. Comply with recommendations of NFPA 70B, Chapter "Testing and Test Methods," Article "Infrared Inspection."
 - b. After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared inspection of the electrical power connections of each motor controller.
 - c. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each motor controller 11 months after date of Substantial Completion.
 - d. Report of Infrared Inspection: Prepare a certified report that identifies the testing technician and equipment used, and lists the following results:
 - 1) Description of equipment to be tested.
 - 2) Discrepancies.
 - 3) Temperature difference between the area of concern and the reference area.
 - 4) Probable cause of temperature difference.
 - 5) Areas inspected. Identify inaccessible and unobservable areas and equipment.
 - 6) Identify load conditions at time of inspection.
 - 7) Provide photographs and thermograms of the deficient area.
 - 8) Recommended action.
 - e. Equipment: Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1 deg C at 30 deg C. The equipment shall detect emitted radiation and convert detected radiation to a visual signal.
 - f. Act on inspection results, recommended action, and considering recommendations of NETA ATS, Table 100.18. Correct possible and

probable deficiencies as soon as Owner's operations permit. Retest until deficiencies are corrected.

5. System Function Tests:

- a. System function tests shall prove the correct interaction of sensing, processing, and action devices. Perform system function tests after field quality-control tests have been completed and all components have passed specified tests.
 - 1) Develop test parameters and perform tests for the purpose of evaluating performance of integral components and their functioning as a complete unit within design requirements and manufacturer's published data.
 - 2) Verify the correct operation of interlock safety devices for fail-safe functions in addition to design function.
 - 3) Verify the correct operation of sensing devices, alarms, and indicating devices.

B. Motor controllers will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.17 VARIABLE-FREQUENCY MOTOR CONTROLLERS

A. Acceptance Testing Preparation:

- 1. Test insulation resistance for each VFC element, bus, component, connecting supply, feeder, and control circuit.
- 2. Test continuity of each circuit.

B. Tests and Inspections:

- 1. Inspect VFC, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
- 2. Test insulation resistance for each VFC element, component, connecting motor supply, feeder, and control circuits.
- 3. Test continuity of each circuit.
- 4. Verify that voltages at VFC locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Engineer before starting the motor(s).

5. Test each motor for proper phase rotation.
6. Perform tests according to the Inspection and Test Procedures for Adjustable Speed Drives stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
8. Perform the following infrared (thermographic) scan tests and inspections, and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each VFC. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each VFC 11 months after date of Substantial Completion.
 - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
9. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
10. Test for the following parameters:
 - a. Input phase loss protection
 - b. Input overvoltage protection
 - c. Output phase rotation
 - d. Over temperature protection
 - e. DC overvoltage protection
 - f. Over frequency protection
 - g. Drive overload protection
 - h. Fault alarm outputs
11. Perform startup of drive in accordance with manufacturer's published data. Calibrate drive to the system's minimum and maximum speed control signals.

- 12. Perform operational tests by initiating control devices.
 - a. Slowly vary drive speed between minimum and maximum. Observe motor and load for unusual noise or vibration.
 - b. Verify operation of drive from remote start/stop and speed control signals.
- C. VFCs will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports, including a certified report that identifies the VFC and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.18 SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

- A. Tests and Inspections:
 - 1. Compare equipment nameplate data for compliance with the Contract Documents.
 - 2. Inspect anchorage, alignment, grounding and clearances.
 - 3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.
- B. SPDs that do not pass tests and inspections will be considered defective.
- C. Prepare test and inspection reports.

3.19 LUMINAIRES

- A. Tests and Inspections:
 - 1. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
 - 2. Inspect lighting poles and standards for burs, nicks, dents, scratches and other damage. Poles or standards determined to be damaged shall be repaired or replaced as required by the Engineer.
 - 3. Operational Test: After installing luminaires, switches and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 - 4. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

5. Test the following controls for proper operation:
 - a. Photoelectrical Controls
 - b. Occupancy/Motion Sensing Controls
 - c. Timeclocks
- B. Prepare test and inspection reports.

3.20 LIGHTING POLES AND STANDARDS

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 1. Inspect poles for nicks, mars, dents, scratches, and other damage.
 2. System function tests.

3.21 LOW-VOLTAGE SWITCHGEAR

- A. Tests and Inspections:
 1. Acceptance Testing:
 - a. Test insulation resistance for each switchboard bus, component, connecting supply, feeder and control circuit. Open control and metering circuits within the switchboard and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.
 - b. Test continuity of each circuit.
 2. Test ground-fault protection of equipment for service equipment per NFPA 70.
 3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 4. Correct malfunctioning units on-site where possible and retest to demonstrate compliance; otherwise, replace with new units and retest.
 5. Perform the following infrared scan tests and inspections and prepare reports.
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switchboard. Remove front panels so joints and connections are accessible to portable scanner.

- b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switchboard 11 months after date of Substantial Completion.
 - c. Instruments and Equipment:
 - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- 6. Test and adjust controls, remote monitoring and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Switchgear will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports, including a certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

3.22 METERING DEVICES

- A. Visual and Mechanical Inspection:
 - 1. Inspect physical and mechanical condition.
 - 2. Verify tightness of electrical connections.
 - 3. Inspect cover gasket, cover glass, condition of spiral spring, disk clearance, contacts, and case-shorting contacts, as applicable.
 - 4. Verify the unit is clean.
 - 5. Verify freedom of movement, end play, and alignment of rotating disk(s).
- B. Electrical Tests:
 - 1. Verify accuracy of meters at all cardinal points.
 - 2. Calibrate meters in accordance with manufacturer's published data.
 - 3. Verify that current transformer and voltage transformer secondary circuits are intact.

3.23 GROUND-FAULT PROTECTION SYSTEMS

- A. Visual and Mechanical Inspection:
 - 1. Inspect the components for damage and errors in polarity or conductor routing.

2. Set pickup and time-delay settings in accordance with the settings provided in the Contractor's coordination study. Record appropriate operation and test sequences as required by NFPA 70 National Electrical Code Article 230.95.

B. Electrical Tests:

1. Measure the system neutral-to-ground insulation resistance with the neutral disconnect link temporarily removed. Replace neutral disconnect link after testing.
2. Perform the following pickup tests using primary injection:
 - a. Verify that the trip unit does not operate at 90 percent of the pickup setting.
 - b. Verify pickup is less than 125 percent of setting or 1200 amperes, whichever is smaller.
3. Measure time delay of the relay at 150 percent or greater of pickup.

C. Test Values:

1. System neutral-to-ground insulation shall be a minimum of 1.0 megohm.
2. Relay timing shall be in accordance with manufacturer's specifications but must be no longer than one second at 3000 amperes.

3.24 ROTATING MACHINERY AND AC MOTORS

A. Visual and Mechanical Inspection:

1. Compare equipment nameplate data with drawings and specifications.
2. Inspect physical and mechanical condition.
3. Inspect anchorage, alignment, and grounding.
4. Inspect air baffles, filter media, cooling fans, slip rings, brushes, and brush rigging.
5. Verify the unit is clean.
6. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or Table 100.12.
7. Verify correct application of appropriate lubrication and lubrication systems.

8. Verify the absence of unusual mechanical or electrical noise or signs of overheating during initial test run.
- B. Electrical Tests – AC Induction Motors:
1. Perform resistance measurements through bolted connections with a low-resistance ohmmeter.
 2. Perform insulation-resistance tests in accordance with ANSI/IEEE 43.
 - a. Motors 200 horsepower and less: Test duration shall be for one minute. Calculate the dielectric-absorption ratio.
 3. Perform stator resistance test phase-to-phase.
 4. Verify operation of the space heater, if applicable.
 5. Perform a rotation test to insure correct shaft direction.
 6. Measure running current and evaluate relative to load conditions and nameplate full-load amperes.
- C. Test Values:
1. Bolt-torque levels should be in accordance with Table 100.12 unless otherwise specified by manufacturer.
 2. Insulation-resistance test results shall be in accordance with values listed in Table 100.1.
 3. Stator resistances should be compared to manufacturer's published data.
 4. Pedestal bearing insulation resistance shall not be less than 1.0 megohm at 500 volts dc.
 5. Motor space heater test results should match nameplate rating.
 6. Machine rotation should match required rotation of connected load.
 7. Running phase-to-phase voltages should be within 1.0 percent. Running currents shall be balanced and proportional to load condition and nameplate data.
 8. The measured resistance values of motor-field winding, exciter-stator windings, exciter-rotor windings, and field-discharge resistors shall be compared to manufacturer's published data.

3.25 LOW-VOLTAGE SURGE PROTECTION DEVICES

A. Visual and Mechanical Inspection:

1. Compare equipment nameplate data with drawings and specifications.
2. Inspect physical and mechanical condition.
3. Inspect anchorage, alignment, grounding, and clearances.
4. Verify the arresters are clean.
5. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or Table 100.12.
6. Verify that the ground lead on each device is individually attached to a ground bus or ground electrode.

B. Electrical Tests:

1. Perform insulation-resistance tests. Use manufacturer's recommended values.
2. Test grounding connection in accordance with paragraph 3.2.

C. Test Values:

1. Compare bolted connection resistances to values of similar connections.
2. Bolt-torque levels should be in accordance with Table 100.12 unless otherwise specified by manufacturer.
3. Microhm or millivolt drop values shall not exceed the high levels of the normal range as indicated in the manufacturer's published data. If manufacturer's data is not available, investigate any values which deviate from similar connections by more than 50 percent of the lowest value.
4. Insulation-resistance values should be a minimum of 25 megohms.
5. Resistance between the arrester ground terminal and the ground system should be less than 0.5 ohm.

3.26 FIBER-OPTIC CABLES

A. Visual and Mechanical Inspection:

1. Compare cable, connector, and splice data with drawings and specifications.

2. Inspect cable and connections for physical and mechanical damage.
3. Verify that all connectors and splices are correctly installed.

B. Electrical Tests:

1. Perform cable length measurement, fiber fracture inspection, and construction defect inspection using an optical time domain reflectometer.
2. Perform connector and splice integrity test using an optical time domain reflectometer.
3. Perform cable attenuation loss measurement with an optical power loss test set.
4. Perform connector and splice attenuation loss measurement from both ends of the optical cable with an optical power loss test set.

C. Test Values:

1. The optical time domain reflectometer signal should be analyzed for excessive connection, splice, or cable backscatter by viewing the reflected power/distance graph.
2. Attenuation loss measurement shall be expressed in dB/km. Losses shall be within the manufacturer's recommendations when no local site specifications are available.

3.27 ELECTRICAL POWER MONITORING AND CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
2. Power Monitoring and Control System Tests.
 - a. Test Analog Signals:
 - 1) Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
 - 2) Check analog current signals using a precision current meter at zero, 50, and 100 percent.
 - 3) Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistant source.

- b. Test Digital Signals:
 - 1) Check digital signals using a jumper wire.
 - 2) Check digital signals using an ohmmeter to test for contact making or breaking.
- c. I/O Control Loop Tests:
 - 1) Test every I/O point to verify that safety and operating control set points are as indicated and as required to operate controlled system safely and at optimum performance.
 - 2) Test every I/O point throughout its full operating range.
 - 3) Test every control loop to verify that operation is stable and accurate.
 - 4) Adjust control loop proportional, integral, and derivative settings to achieve optimum performance while complying with performance requirements indicated. Document testing of each control loop's precision and stability via trend logs.
 - 5) Test and adjust every control loop for proper operation according to sequence of operation.
 - 6) Test software and hardware interlocks for proper operation.
 - 7) Operate each analog point at the following:
 - a) Upper quarter of range.
 - b) Lower quarter of range.
 - c) At midpoint of range.
 - 8) Exercise each binary point.
 - 9) For every I/O point in the system, read and record each value at workstation, at controller, and at field instrument simultaneously. Value displayed at workstation and at field instrument shall match.
 - 10) Prepare and submit a report documenting results for each I/O point in the system, and include in each I/O point a description of corrective measures and adjustments made to achieve desired results.

- B. Wiring and cabling will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.28 HARMONIC MITIGATION

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies and equipment installations, including connections and to assist in testing.
- C. Tests and Inspections:
 - 1. Harmonic compliance shall be verified with onsite field measurements of both the voltage and current harmonic distortion at the service disconnect with and without the associated motors/equipment operating.
- D. Harmonic mitigation equipment will be considered defective if it does not pass tests and inspections.

3.29 SYSTEM FUNCTION TESTS

- A. It is the purpose of system function tests to prove the correct interaction of all sensing, processing, and action devices. Perform system function tests upon the completion of acceptance testing required on specified equipment.
- B. Develop test parameters and perform tests for the purpose of evaluating performance of all manufacturer's published data.
- C. Verify the correct operation of all interlock safety devices for fail-safe functions in addition to design function.
- D. Verify the correct operation of all sensing devices, alarms, and indicating devices.

END OF SECTION

MOTOR DATA AND TEST REPORT

EQUIPMENT NAME AND NUMBER: _____

EQUIPMENT SPECIFICATION SECTION: _____

MOTOR STARTER LOCATION _____

CONTRACTORS REPRESENTATIVE _____ Date _____

MOTOR NAMEPLATE DATA

MFR Name/Model No. _____

Voltage/Phase/HP _____

FLA/LRA _____

Service Factor _____

Efficiency Index (or percent) _____

NEMA Design _____

Code Letter _____

Insulation Type _____

Temperature Rise _____

Ambient Temperature _____

RPM _____

Enclosure _____

Thermal Trip Setting _____

Space HTR: Watts/Volts _____

Other Data _____

MOTOR STARTER INFORMATION

Manufacturer/Type _____

Overload Heater No _____

* RECORDED FULL LOAD DATA	VOLTS	A-G	_____	B-G	_____	C-G	_____
FULL LOAD OPERATING VOLTAGE	VOLTS	A-B	_____	B-C	_____	C-A	_____
FULL LOAD OPERATING CURRENT	AMPS	A	_____	B	_____	C	_____
INSULATION RESISTANCE	MEGOHMS	A-G	_____	B-G	_____	C-G	_____
MOTOR CIRCUIT RESISTANCE	OHMS	A-B	_____	B-C	_____	C-A	_____

*VOLTAGE & CURRENT READINGS SHALL BE TAKEN AT THE CLOSEST ACCESSIBLE POINT TO THE LOAD

TRANSMITTER CALIBRATION / TEST DATA FORM

Tag. No. and/or Description: _____ Serial No. _____

Make and Model No.: _____

Associated Panel: _____

Type of testing equipment used: _____

Input: _____

Output: _____

Range: _____ Scale: _____

Calibrated Value (flow/pressure/turbidity etc.) at 4mA _____

Calibrated Value (flow/pressure/turbidity etc.) at 20mA _____

Simulate process variable (flow, pressure, turbidity, etc.) and measure output with appropriate meter.

Related value is (example: the level associated with the pressure).

<u>% Range</u>	<u>Input (engr. units)</u>	<u>Related value</u>	<u>Expected Output</u>	<u>Actual Output</u>
0	_____	_____	_____	_____
25	_____	_____	_____	_____
50	_____	_____	_____	_____
75	_____	_____	_____	_____
100	_____	_____	_____	_____

COMMENTS:

TESTED BY _____ DATE: _____

OWNERS REPRESENTATIVE _____ DATE: _____

ELECTRICAL SYSTEM TEST REPORT – 600V CABLE

ELECTRICAL SYSTEM

DESCRIPTION DATA

SERVICE DESCRIPTION:

Nominal Voltage, Phase To Phase

Phase To Neutral – Single Or Three Phases-

Number Of Conductors

SERVICE CONDUCTORS:

Phase Size And Insulation Type

Neutral Size And Insulation Type

Ground Size And Insulation Type

SERVICE DISCONNECT DESCRIPTION:

Circuit Breaker Or Disconnect Switch

Size (amps)

Fuse (amps)

MEASURED CONDITIONS

DATA

Operating Load Voltage

Volts

Vab

Vbc

Vca

Van

Vbn

Vcn

Operating Load Feeder Current

Amps

Ia

Ib

Ic

a-b

b-c

c-a

Conductor Insulation Mega ohms

Mega Ω

a-g

b-g

c-g

Resistance - record the indicated measurement for each of the following circuits:

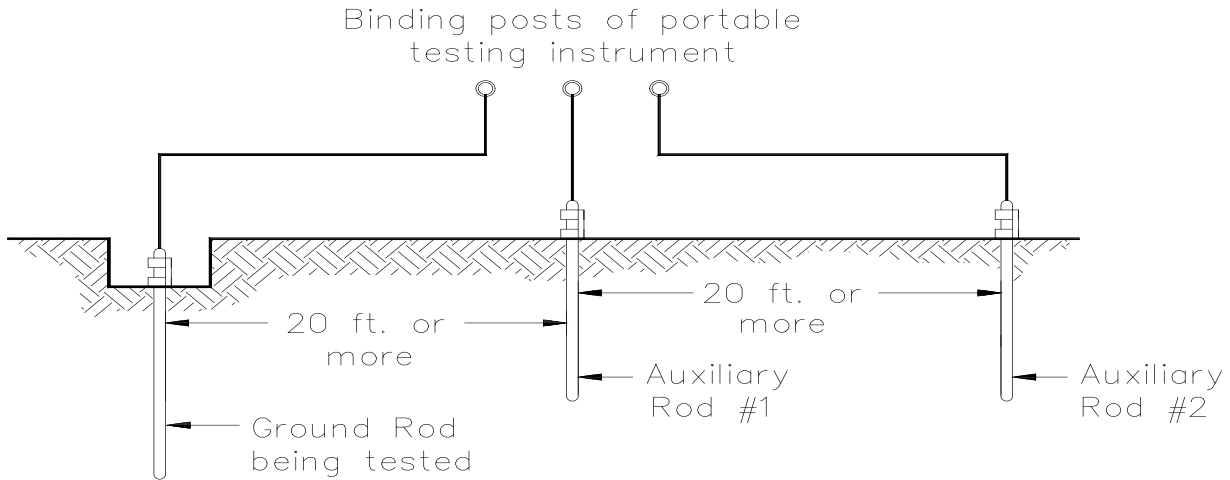
Service Feeder

Pump Feeders

Motor Feeders

480V Feeders

ELECTRICAL GROUND ROD TEST REPORT



GROUND ROD RESISTANCE TESTING

PROCEDURE:

To measure ground resistance, two additional temporary grounds, consisting of short rods 2 or 3 feet long, shall be driven in the ground at least 20 feet away from the rod being tested. A direct-reading ground resistance tester shall then be connected to the three ground rods by means of insulated leads. The battery operated ground resistance tester reads the resistance of the ground rod being tested directly in ohms. The ground rod location / designation and its measured ohm value shall be recorded in chart below.

GROUND ROD LOCATION / DESIGNATION	OHM VALUE
1.	*
2.	*
3.	*
COMPOSITE GROUND	*

*Ohm value of a single ground rod shall not exceed 25 Ohms. If additional ground rod(s) are added, the "composite" ground electrode shall have a maximum acceptable reading of 15 Ohms which shall be recorded in chart above.

SECTION 16679
ELECTRICAL POWER MONITORING AND CONTROL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes equipment and systems used to monitor and control electrical consumption:
 - 1. Multifunction meters.
- B. Related Requirements:
 - 1. Section 16112 "Electricity Metering" for requirements and responsibilities on the provision of utility metering equipment.

1.3 DEFINITIONS

- A. Active Power: The average power consumed by a unit. Also known as "real power."
- B. Analog: A continuously varying signal value, such as current, flow, pressure, or temperature.
- C. Apparent (Phasor) Power: " $S = VI$ " where "S" is the apparent power, "V" is the rms value of the voltage, and "I" is the rms value of the current.
- D. Firmware: Software (programs or data) that has been written onto read-only memory (ROM). Firmware is a combination of software and hardware. Storage media with ROMs that have data or programs recorded on them are firmware.
- E. KY Pulse: A method of measuring consumption of electricity that is based on a relay operating like a SPST switch.
- F. KYZ Pulse: A method of measuring consumption of electricity based on a relay operating like a SPDT switch.
- G. LAN: Local area network.
- H. L-G: Line to ground.

- I. L-L: Line to line.
- J. L-N: Line to neutral.
- K. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or remote-control, signaling and power-limited circuits.
- L. Modbus TCP/IP: An open protocol for exchange of process data.
- M. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.
- N. N-G: Neutral to ground.
- O. Power Factor: The ratio of active power to apparent power, sometimes expressed in percentage.
- P. rms: Root-mean-square value of alternating voltage, which is the square root of the mean value of the square of the voltage values during a complete cycle.
- Q. TCP/IP: Transport control protocol/Internet.
- R. UPS: Uninterruptible power supply; used both in singular and plural context.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for power monitoring and control.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For power monitoring and control equipment.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, method of field assembly, components, and location and size of each field connection.
 - a. Attach copies of approved Product Data submittals for products (such as switchboards, switchgear, and motor-control centers) that describe the following:

- 1) Location of the meters and gateways, and routing of the connecting wiring.
 - 2) Details of power monitoring and control features to illustrate coordination among related equipment and power monitoring and control.
3. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.
 4. Include diagrams for power, signal, and control wiring. Coordinate nomenclature and presentation with a block diagram.
 5. Surge Suppressors: Data for each device used and where applied.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Design Data:
 1. Manufacturer's system installation and setup guides, with data forms to plan and record options and setup decisions.
 - a. Project Record Drawings of as-built versions of submittal Shop Drawings provided in electronic PDF format on compact disk or portable storage device with a USB interface.
 - b. Testing and commissioning reports and checklists of completed final versions of reports, checklists, and trend logs.
 - c. As-built versions of submittal Product Data.
 - d. Names, addresses, e-mail addresses, and 24-hour telephone numbers of Installer and service representatives for the system and products.
 - e. Operator's manual with procedures for operating control systems including logging on and off, handling alarms, producing point reports, trending data, overriding computer control, and changing set points and variables.
 - f. Programming manuals with description of programming language and syntax, of statements for algorithms and calculations used, of point

database creation and modification, of program creation and modification, and of editor use.

- g. Engineering, installation, and maintenance manuals that explain how to do the following:
 - 1) Design and install new points, panels, and other hardware.
 - 2) Perform preventive maintenance and calibration.
 - 3) Debug hardware problems.
 - 4) Repair or replace hardware.
- h. Documentation of all programs created using custom programming language including set points, tuning parameters, and object database.
- i. Backup copy of graphic files, programs, and database on compact disk or portable storage device with a USB interface.
- j. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.
- k. Complete original-issue copies of furnished software, including operating systems, custom programming language, workstation software, and graphics software on compact disk or portable storage device with a USB interface.
- l. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.
- m. Owner training materials.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For power monitoring and control units to include in operation and maintenance manuals.
- B. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Software licenses.
 - 3. Software service agreement.

4. PC installation and operating documentation, manuals, and software for the PC and all installed peripherals. Provide separately for each PC.
5. Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on compact disk or portable storage device with a USB interface of the hard-copy submittal.
6. Program Software Backup: On compact disk or portable storage device with a USB interface, complete with data files.
7. Device address list.
8. Printout of software application and graphic screens.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Addressable Relays: One for every 10 installed. Furnish at least one of each type.
 2. Data Line Surge Suppressors: One for every 10 of each type installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.9 COORDINATION

- A. Coordinate features of distribution equipment and power monitoring and control components to form an integrated interconnection of compatible components.
 1. Match components and interconnections for optimum performance of specified functions.
- B. Coordinate Work of this Section with those in Sections specifying distribution components that are monitored or controlled by power monitoring and control equipment.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Microprocessor-based monitoring of electrical power distribution system(s) that includes the following:
 - 1. Electrical meters that monitor and connect to the data transmission network.
 - 2. LAN: High-speed, multi-access, open, nonproprietary, industry-standard communication protocols.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. UL Compliance: Listed and labeled as complying with UL 61010-1.

2.2 PERFORMANCE REQUIREMENTS

- A. Surge Protection: For external wiring of each conductor entry connection to components to protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads.
 - 1. Minimum Protection for Power Lines 120 V and More: Suppressors complying with requirements in Section 16483 "Surge Protection for Low-Voltage Electrical Power Circuits."
 - 2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Comply with requirements as recommended by manufacturer for type of line being protected and comply with Section 16483 "Surge Protection for Low-Voltage Electrical Power Circuits".
- B. Addressable Devices: All transmitters and receivers shall communicate unique device identification and status reports to monitoring and control clients.

2.3 MULTIFUNCTION ENERGY METERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Eaton.
 - 2. Siemens.

3. Schneider Electric.
 4. General Electric Co.
- B. Multifunction Energy Meter: Front-mounted, modular, permanently installed, solid-state, digital I/O instrument for power and energy metering and monitoring; complying with UL 61010-1.
1. Capable of metering 4-wire Y, 3-wire Y, 3-wire delta, and single-phase power systems.
- C. Environment: System components shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
1. Indoor installation in spaces that have environmental controls to maintain ambient conditions of minus 14 deg to 130 deg F dry bulb and 5 to 95 percent relative humidity, noncondensing.
 2. Comply with IEC 60529 degree of protection code of IP50 or 54 for the front of the meter, and code of IP30 or 20 for the body.
 3. Overvoltage: Comply with UL 61010-1 overvoltage withstand rating for CAT III.
 4. Accuracy:
 - a. Active Energy: Comply with ANSI C12.20, Class 0.2s.
 - b. Current Measurement: 0.2% FS.
 - c. Voltage Measurement: 0.2% FS.
 - d. Power Factor: 0.5 percent.
 - e. Frequency: 0.1 percent.
 - f. Waveform Sampling: 256 per cycle.
- D. Data Link:
1. Ethernet, RJ45 port.
- E. Meter Physical Characteristics:
1. Display: Backlit LCD with antiglare and scratch-resistant lens.
 2. Display of Metered Values:

- a. One screen to show at least three user-selected values displayed at the same time. Selections available to display shall include the following:
 - 1) All meters.
 - 2) Measurements.
 - 3) THD.
 - 4) Energy.
 - 5) Demand.
 - 6) Minimum and maximum values.
 - 7) Power demand.

F. Meters:

- 1. Instantaneous, rms:
 - a. Current: Each phase, neutral and three-phase average.
 - b. Voltage: L-L each phase, L-L three-phase average, L-N each phase, and L-N three-phase average.
 - c. Active Power (kW): Each phase and three-phase total, import (positive) and export (negative).
 - d. Reactive Power (kVAR): Each phase and three-phase total, positive and negative.
 - e. Apparent Power (kVA): Each phase and three-phase total.
 - f. Power Factor: Each phase and three-phase total.
- 2. Energy:
 - a. Active Energy (kWh): Three-phase total, import (positive) and export (negative).
 - b. Reactive Energy (kVARh): Three-phase total, positive and negative.
- 3. Demand, Derived from Instantaneous rms Meters:
 - a. Current: Present and maximum.

- b. Active: Present and maximum.
 - c. Reactive: Present and maximum.
 - d. Apparent: Present and maximum.
- 4. Power Quality Measurements:
 - a. THD: Instantaneous and maximum measured from current and voltage measurements simultaneously from the same cycle through the 50th harmonic, as can be calculated from the specified sampling rate.
- G. I/O: Two optically isolated digital outputs for KY pulsing or control. Output signal characteristics shall be 150 mA at 200 V.
 - 1. KY Pulse: Generate standard KY pulses for a user-defined increment of metered active energy as follows:
 - a. User-defined pulse output, associated with kWh.
 - b. User-defined pulse output, associated with kVARh.
- H. Capacities and Characteristics:
 - 1. Power Supply: 120-V ac, 60 Hz.
 - 2. Circuit Connections:
 - a. Voltage: Measurement autoranging, 60- to 400-V ac L-N. Connect directly to low-voltage (600 V and less) without using voltage transformers. Connect to instrument grade potential transformers secondary at 120 V. Meter impedance shall be 2-megohm L-L or greater.
 - 1) Overload Tolerance: 1500-V ac, rms, continuously.
 - b. Current: Connect to instrument grade current transformer with a metering range of 5 mA to 6 A. Overcurrent tolerance of the instrument shall be 20 A continuous, 50 A for 10 seconds once per hour, and 100 A for one second per hour.
 - c. Frequency: 45 to 64 Hz.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 POWER MONITORING AND CONTROL SYSTEM INSTALLATION

- A. Comply with NECA 1.
- B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
- C. Wiring and Cabling Installation:
 - 1. Comply with Section 16119 "Low-Voltage Electrical Power Conductors and Cables" for electrical power wiring.
 - 2. Comply with Section 16123 "Control-Voltage Electrical Power Cables" for control wiring.
- D. Raceways Installation:
- ~~E.~~ Comply with Section 16153 "Raceways and Boxes for Electrical Systems" for electrical raceways.
- F. Identification Installation:
 - 1. Comply with Section 16119 "Low-Voltage Electrical Power Conductors and Cables" for electrical power wiring.

3.3 GROUNDING

- A. For data communication wiring, comply with NECA/BICSI 568.
- B. For low-voltage control wiring and cabling, comply with requirements in Section 16126 "Grounding and Bonding for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections as specified in section 16670 "Electrical Testing".

3.5 FINAL REVIEW

- A. Submit written request to Engineer when the power monitoring and control system is ready for final review. Written request shall state the following:
 - 1. The system has been thoroughly inspected for compliance with Contract Documents and found to be in full compliance.
 - 2. The system has been calibrated, adjusted, and tested and found to comply with requirements of operational stability, accuracy, speed, and other performance requirements indicated.
 - 3. The system monitoring and control of electrical distribution systems results in operation according to sequences of operation indicated.
 - 4. The system is complete and ready for final review.
- B. Review by Engineer will be made after receipt of written request. A field report shall be issued to document observations and deficiencies.
- C. Take prompt action to remedy deficiencies indicated in field report and submit a second written request when all deficiencies have been corrected. Repeat process until no deficiencies are reported.
- D. Final review shall include a demonstration to parties participating in final review.

3.6 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 - 1. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the power monitoring and control system.

END OF SECTION

SECTION 16851
HEATING VENTILATION AND AIR CONDITIONING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

- A. This section covers the electrical coordination and installation of all mechanical equipment: heaters, fans, thermostats, and dehumidifiers.

1.2 STANDARDS AND CODES

- A. Comply with all provisions of the following standards, latest edition except where otherwise indicated:
1. National Electrical Code
 2. UL Requirements
 3. NEMA Standards

1.3 COORDINATION

- A. The Contractor is fully responsible for coordination of mechanical equipment, fans, louvers, heaters, motors, starters, etc. and the electrical power and control requirements. Provided in this section and other sections of the specifications and drawings.
- B. The Contractor shall provide power and control equipment, wiring, and raceways to meet the requirements of the mechanical equipment supplied.
- C. The Contractor shall verify as a minimum:
1. Correct voltage, phase and frequency
 2. Correct motor starter type
 3. Proper coordination with the controls and control system Integrator.
- D. The Contractor shall provide all necessary control wiring and components for any special requirements from an equipment manufacturer.
- E. Any discrepancies between the electrical and mechanical equipment shall be brought to the immediate attention of the Engineer.

1.4 ACTION SUBMITTALS

- A. Project data submitted in accordance with Section 16010 shall include but not be limited to the following:
 - 1. Catalog data showing material information and conformance with the specifications. The intended use of each item shall be indicated.
 - 2. Each piece of equipment shall be clearly identified and shall include:
 - a. All electrical data for equipment, including voltage, watts, hp, etc.
 - b. Schematics and wiring diagrams for all control and power features and requirements.
 - c. Installation details and operation data.

1.5 CLOSEOUT SUBMITTALS

- A. The manufacturer shall prepare and assemble detailed operation and maintenance manuals in accordance with the requirements. The manuals shall include, but not be limited to the following:
 - 1. Preventative maintenance procedures
 - 2. Trouble-shooting
 - 3. Replacement of components
 - 4. System schematics
 - 5. As-built wiring diagrams of overall system
 - 6. Catalog data and complete parts list for all equipment and control devices.

PART 2 PRODUCTS

2.1 MECHANICAL EQUIPMENT

- A. Reference the Electrical / Mechanical Equipment Schedule on drawing E-110.

2.2 CONTROL DEVICES PROVIDED BY ELECTRICAL CONTRACTOR

- A. Reference specification 16906, table 16906-A.

PART 3 EXECUTION

3.1 MOUNTING

- A. Ceiling mounted heaters shall be ceiling mounted using factory mounting kit. Connections to the heater shall be with liquidtight flexible metal conduit.
- B. Wall heaters shall be surface wall mounted with the bottom of the heater at minimum 7' - 6" above the floor. Connections to the heater shall be with liquidtight flexible metal conduit.

3.2 POWER & CONTROL WIRING

- A. Contractor shall provide and install all necessary power and control wiring and raceways for installation in accordance with the manufacturer's requirements and the requirements of the contract drawings and specifications.
- B. Provide disconnects for all power circuits in accordance with NEC.
- C. Provide control wiring and raceway to thermostats and other control devices.
- D. Provide power and control wiring and raceways to motor operated louvers per the manufacturers requirements.

3.3 THERMOSTAT/HUMIDISTANT MOUNTING

- A. Thermostats shall be wall mounted at 60 inches above finished floor. Wiring shall be routed in 1/2 inch conduit vertically from thermostat to wall heater.

END OF SECTION

SECTION 16906
PROCESS INSTRUMENTATION METERS AND TRANSMITTERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Division 16, Section 16928 "Control System"

1.2 DESCRIPTION

- A. Description of Work:
 - 1. Furnish, calibrate, test, adjust, and place into satisfactory operation the process instrumentation and transmitters as shown on the Drawings, as required by Section 16928, Control System and specified herein. These installation and testing requirements pertain to all equipment and instruments that are as furnished by this Contract.
 - 2. The Drawings and Specifications illustrate and specify functional and general construction requirements of the sensors and field instruments and do not necessarily show or specify all components, wiring, piping, and accessories required to make a completely integrated system. Contractor shall provide all piping, wiring, accessories, and labor required for a complete workable and integrated system.
 - 3. Contractor shall be responsible for installing in-line flow elements and for providing taps in the process piping systems for installation of other flow, pressure, and temperature sensing instrumentation and for the analyzers.
 - 4. The CSI shall supply the instruments. In the event that a particular instrument is not listed, the CSI shall obtain from the Engineer the instrument type and specifications for use prior to submitting the proposal. The CSI shall list quantities, type, manufacturer, model number, and materials of construction that deviate from these specifications.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4 SUBMITTALS

- A. Refer to section 16012 and section 16928.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Refer to section 16012 and section 16928.

PART 2 PRODUCTS

2.1 INSTRUMENTATION

- A. Instrumentation devices are specified in table 16906-A.

2.2 HEAT DETECTOR

- A. HD-A, HD-B (Indian Hills and Ponderosa)
- B. Rate of rise, 194 def F, UL listed, 24VDC, normally open contact, Edwards 282B-PL, or equal.

2.3 TEMPERATURE TRANSMITTER

- A. TT-01 (Indian Hills and Ponderosa)
- B. Element: -58 to 482 deg F, 0.5%, 100 ohm platinum RTD, Measurement Solutions Model 517M-P2C-3S, or equal.
- C. RTD Transmitter: DIN rail mounted, UL listed, 24VDC, 4-20mA output, Endress Hauser iTemp TMT111, or equal

2.4 FLOOD SWITCH

- A. LS-01 (Indian Hills and Ponderosa)
- B. Polypropylene float, 9/16" actuation, UL Listed, NC contact, GemSensor part number 116826, or equal.

2.5 SPARE PARTS

- A. Spare Parts for process instrumentation shall be in accordance with Section 16012 and section 16928.
- B. Spare parts shall be shipped with the control panels in a separate container, with a Bill of Materials, and specifically marked "SPARE PARTS".

PART 3 EXECUTION

- A. CSI shall coordinate the installation of the instrumentation and control system equipment as referenced above.
- B. Install each item in accordance with manufacturer's recommendations and in accordance with the Contract Documents. Transmitters and instruments shall be mounted so they are accessible while standing on the floor. Care shall be taken in the installation to ensure sufficient space is provided between instruments and other equipment or piping to allow for easy removal and servicing.
- C. All items shall be mounted and anchored using stainless steel hardware unless otherwise noted.
- D. All field instruments shall be rigidly secured to walls, stands or brackets.
- E. Conform to all applicable provisions of the NEMA standards, NEC and local, State and Federal codes when installing the equipment and interconnecting wiring.

PART 4 TABLES

4.1 INSTRUMENTATION DEVICES – TABLE 16906-A

Instrument Type:		Flow Indicating Transmitter	FIT Type I
Typical Application:		Flow measurement of process fluids for water and wastewater	
Description:		Magnetic Flowmeter and Transmitter	
XMTR	Power Supply	24VDC/120VAC	
	Inputs	N/A	
	Outputs	Flow Totalizing Pulse; Adjustable 0.05-2000ms	
		(1) 4-20mA	
	Accuracy	±0.4%	
	Low Flow Cutoff	Not more than 5%	
	Mounting	Integral or Remote where indicated	
	Enclosure	NEMA 4X/IP67	
	Operating Temperature	-20°C to 60°C	
ELEMENT	Liner	Ebonite/Hard Rubber	
	Measurement Range	0 to 10 m/s	
	Enclosure	NEMA 4x/IP67; Carbon Steel or Stainless Steel	
	Process Temperature	0°C to 70°C	
Notes			
Manufacturer and Model:			
1	SIEMENS SITRANS FM MAG 5000 with 5100 W sensor.		
2	Proline Program W 400		
3	or approved equal.		
Instrument Schedule: Indian Hills FIT/FE-01, FIT/FE-02; Pondersosa FIT/FE-01, FIT/FE-02			
Note: Reference wiring diagrams and plan sheets for additional requirements, such as operating ranges and size			

Instrument Type:		Pressure Transmitter (PIT/PT)	PIT Type I
Typical Application:		Water and wastewater, monitoring of pressure in process flow	
Description:		Pressure transmitter with integral or remote display	
XMTR	Power Supply	Loop powered	
	Inputs	N/A	
	Outputs	4-20mA HART	
	Display	LCD screen for PIT Units	
	Enclosure	NEMA4X, IP68	
	Mounting	Remote or Integral	
	Humidity	0-100% relative humidity	
	Operating Temperature	(-40 to 176 Degree F)	
ELEMENT	Sensor		
	Cable Jacket		
	Wetted Parts	Stainless Steel	
	Rating		
	Type	Gage Pressure	
	Accuracy	(+/-)0.075%	
	Range	Per instrumentation schedule	
Notes: U.L. Listed. Provide remote mounting option for units below-grade or installed in locations more than 48" above finished grade			
Manufacturer and Model:			
1	Rosemount 2088		
2	or approved equal.		
Instrument Schedule: Indian Hills PIT-01, PIT-02; Pondersosa PIT-01, PIT-02			
Note: Reference wiring diagrams and plan sheets for additional requirements, such as operating ranges for specific tag numbers.			

Instrument Type:		Pressure Switch	PS Type I
Typical Application:		Commercial/ Industrial Applications	
Description:		Pressure Switch with adjustable deadband and setpoint	
SWITCH	Power Supply	115V, 1-Phase	
	Inputs		
	Outputs	5A Resistive SPDT	
	Range	per Instrument Schedule	
	Set Points	per Instrument Schedule	
	Enclosure	NEMA4X	
	Mounting	Pipe-mounted	
	Accuracy	1% of span	
	Deadband	Adjustable	
Notes: U.L. Listed.			
Manufacturer and Model:			
1	Ashcroft B-Series		
2	United Electric 100 Series		
3	or approved equal		
Instrument Schedule: Indian Hills PSH-01, 02, 03, 04, 05; PSL-01, 02, 05			
Pondersosa PSH-01, 02, 03, 04, 05; PSL-01, 02, 05			
Note: Reference wiring diagrams and plan sheets for additional requirements, such as operating ranges for			

SECTION 16927
APPLICATION SOFTWARE

1.00 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work required in this section includes the programming and configuration of the software required to monitor and control the City of Moscow's New Ponderosa and Indian Hills Booster Station.
- B. Blue Logic, LLC (the Programmer) shall be retained by the Control Systems Integrator to provide the application software and startup services.
- C. The Programmer shall be solely and completely responsible for the final design and configuration of the Application Software for the booster station control system. The system shall be designed to provide the control capabilities and functions indicated and implied by these specifications and the Contract Drawings and to provide trouble-free operation with minimum maintenance. Wherever possible, the system shall provide manual operation of all functions and plant equipment controlled by the system (either locally or from the SCADA System, as applicable). Wherever possible, manual operation shall be possible in the event of failure of any one component.
- D. The Programmer in accordance with the operating descriptions and logic presented hereinafter, shall program the programmable logic controller (PLC), operator interface unit (OIU), and supervisory control and data acquisition (SCADA) and HMI systems (i.e. the System). The operating instructions are as described in the Applications Software Standard Functions and the OIU System Functional Requirements. The operating descriptions are included in the specification for reference as a written indication of the functions to be provided by the System.
- E. The System shall consist of the PLC system, OIU'S, SCADA system (including the Ethernet network and components), process network and components, UPS, power monitors.
- F. All drawings, applications software, documentation, licensed software, etc. provided and/or used by the Control Systems Integrator shall be the property of the City of Moscow, no exceptions. Application software and documentation provided by the Control Systems Integrator shall not be copyrighted, no exceptions.
- G. In general the work also consists of, but is not limited to, the following:
 - 1. Coordinating work and schedule with the Owner, Engineer and Contractor in order to complete the work as specified.
 - 2. Receiving, configuring, and factory acceptance testing of equipment furnished by Others (Contractor, Owner, etc.).
 - 3. Operational testing in conjunction with the Contractor.
 - 4. Functional acceptance testing, Owner training, and complete "as built" system documentation.

1.02 DEFINITIONS

- A. "SCADA" is the Supervisory Control And Data Acquisition system and includes the hardware and software required to accomplish supervisory and control functions.
- B. "HIM" is the Human Interface Module component of the SCADA system. It includes integrated devices that contain a text or graphics component.
- C. "PLC" is the Programmable Logic Controller. PLCs contain the control algorithms that accomplish the actual operation of the plant. Field devices are connected to the PLC either directly through input and output cards or via a communications link like serial or Ethernet.
- D. "OIU" is an Operator Interface Unit. It is a device other than a PC such as a touch screen used to perform operator functions over a network, and will be used to display system alarms.

1.03 SUBMITTALS

- A. All documentation provided in hardcopy and electronic format.
- B. Develop and submit to the Engineer the following project data:
 - 1. PLC and OIU system communications (i.e. SCADA network, PLC, process network, UPS serial port, etc.) configurations printouts.
 - 2. PLC ladder logic (fully documented, annotated, and cross-referenced).
 - 3. OIU graphic displays (color printouts).
 - 4. OIU system control, tag and alarm tag configuration documentation.
 - 5. Report generation configuration, including all macros, scripts, worksheets, workbooks, utilities, programs, etc. used in configuring and/or generating the reports.
 - 6. System backup and restore procedures for the PLC and OIU systems. Step-by-step instructions on operator use of these procedures shall be included in the Operations and Maintenance Manual.
- C. Equipment Auto Restart sequence list.

1.04 WARRANTY

- A. As part of the guarantee the Control Systems Integrator shall make any and all repairs, replacements, modifications and adjustments required to eliminate any and all defects in design or workmanship which may be identified within the one year guarantee period.
- B. Warranty begins following Substantial Completion and delivery of final "as built" submittal.

2.00 PRODUCTS

2.01 APPLICATIONS SOFTWARE STANDARD FUNCTIONS

A. Standard PLC Programming Functions:

1. PLC Standard Function No. 1 – Equipment Run Timers:
 - a. For each equipment RUNNING (i.e. ON) status input, track the runtime of the associated equipment item. Accumulate equipment runtime in tenths of hours on retentive timers with no timer reset due to equipment stoppage or power loss. Display the run-time data on the OIU graphic displays.
 - b. Provide a command interface to allow individual reset of equipment run timers through local OIU.
 - c. Timer values displayed in "XXXXX.X hrs" format.
2. PLC Standard Function No. 2 – Equipment Failure Detection:
 - a. Provide for each equipment item controlled by the PLC for which the PLC receives RUNNING and AUTO or REMOTE status signals.
 - b. Monitor for a fail condition when the unit is in the AUTO or REMOTE mode. A failure condition shall be activated when the unit is commanded by the PLC to run, and the PLC does not receive the unit's ON status signal after a delay period (unless otherwise noted default time shall be 10 seconds).
 - c. When a failure condition is detected, inhibit the PLC run command to the unit. Reset the failure condition when the unit is taken out of the AUTO or REMOTE mode.
 - d. Where noted, a failure condition shall activate a lag or a standby unit.
 - e. As required to eliminate nuisance alarming, the Control Systems Integrator shall include a time delay for the situation when an operator is using the field mounted "JOG" function. The delay shall account for the time delay in the "running but not called when in AUTO" functionality in order to eliminate nuisance alarming.
3. PLC Standard Function No. 3 – Analog Signal Scaling:
 - a. Provide program logic to scale the incoming station process analog signals to engineering units that correspond to the calibrated range of the field sensor. Store the scaled value in a PLC memory register for use in process control programming and for transmission to all OIU's.
4. PLC Standard Function No. 4 – Analog Alarms:
 - a. Where indicated provide the capability to detect and annunciate alarms, such as HIGH-HIGH, HIGH, LOW, and LOW-LOW for analog process signals. The PLC shall continuously compare the scaled process signal to the set point value stored in PLC register memory. If

the scaled process signal exceeds the alarm set point, the PLC shall initiate an alarm signal to the OIU's and to external annunciation equipment as noted in these specifications or on the drawings.

- b. The analog alarm function shall also have the following capabilities:
 - 1 Provide time delays on all alarm set points. When the PLC detects a scaled process signal exceeding set point, initiate the alarm delay timer. At the end of the delay time, activate the alarm. Unless otherwise noted, delay time shall be 5 seconds.
 - 2 Unless otherwise specified, all analog alarms shall be self-resetting. The PLC shall reset the alarm condition when the scaled process signal value is within the set point value plus (or minus) a dead band. Unless otherwise noted, dead band shall be 2 percent of range.
 - 3 For all alarms, provide alarm ENABLE/DISABLE program logic that responds to commands from any OIU. Suppress the activation of alarms when commanded to the DISABLE mode.
 - 4 Provide program logic to receive alarm set point commands from any OIU and store in PLC register memory.
 - 5 See PLC Standard Function No. 8 - Remote Alarm Notification for additional requirements.
- c. Control Systems Integrator shall coordinate all final process variable alarm set points with the ENGINEER before beginning system configuration.

5. PLC Standard Function No. 5 – Discrete Alarms:

- a. Provide adjustable alarm delay timers on all discrete alarm input signals monitored by the PLC. Upon detection of the alarm condition, the PLC shall initiate the time delay. At the end of the time period, the PLC shall communicate the alarm condition to the OIU system and to external annunciation equipment as noted. Unless otherwise noted, delay time shall be 5 seconds.
- b. The discrete alarm function shall have the following capabilities:
 - 1 Unless otherwise specified, all discrete alarms shall be self-resetting. The PLC shall reset the alarm condition when the alarm input signal resets. All alarm annunciation indications shall remain energized until acknowledged.
 - 2 For all alarms, provide alarm ENABLE/DISABLE program logic that responds to commands from any OIU. Suppress the activation of alarms when commanded to the DISABLE mode.
 - 3 Control Systems Integrator shall coordinate control interface (action) of discrete inputs and outputs with the Contractor. Coordination shall include the action of discrete input contacts (i.e. open on alarm, closed on alarm).

- 4 See PLC Standard Function No. 8 - Remote Alarm Notification for additional requirements.

6. PLC standard Function No. 6 – OIU/PLC Discrete Command Communication:

- a. Provide a command confirmation communication structure in the PLC program logic. When the PLC receives the command signal, the program logic will execute the command function and will then transmit to the OIU system a confirmation of command execution status signal. Example: When an alarm DISABLE command is received from any OIU, the alarm detection program logic for the specified alarm will be bypassed by the PLC. The PLC will then transmit an ALARM DISABLED status signal to the OIU system to confirm to the operator that the command was received and executed.
- b. In conjunction with the local control switch, when the local control switch is selected to REMOTE (or AUTO), all controlled equipment shall be provided with SCADA display of local selector switch position, i.e. display the current local control mode status of LOCAL or REMOTE (or AUTO). Also, when it is selected to REMOTE (or AUTO), from SCADA the operator shall be able to change the SCADA operating mode to be either SCADA MANUAL or SCADA AUTO. When selected to SCADA MANUAL the operator shall be able to command the unit to START or STOP. When operating in SCADA MANUAL mode all AUTO mode interlocks shall be bypassed. Note: equipment protection interlocks will function in any mode.
- c. Control Systems Integrator shall coordinate control interface (action) of discrete inputs and outputs with the Contractor. Coordination shall include the action of discrete input contacts (i.e. open on control, closed on control).

7. PLC Standard Function No. 7 – OIU/PLC Analog Command Communications:

- a. All analog command signals received from any OIU shall be in the form of integer or floating point numerical commands. Provide program logic in the PLC to store the command value in the PLC register memory for use in the PLC program.
- b. Provide a command confirmation communication structure in the PLC program logic. When the PLC receives the analog command signal, the program logic will execute the command function and transmit to the OIU system a confirmation of command execution status signal. The confirmation signal shall be transmitted to the OIU system.
- c. Example: When an alarm set point command value is received from the OIU system, the new set point value will be moved into the alarm detection program logic for the specified alarm. The PLC will then transmit a "current alarm set point" value signal to the OIU system to confirm to the operator that the new set point value was received and stored in PLC memory.

8. PLC standard Function No. 8 – Remote Alarm Notification:

- a. The hardwired alarm dialer will function as the notification device for all "CRITICAL" alarms.

- b. The CONTROL SYSTEMS INTEGRATOR shall test and demonstrate all remote alarm notification functions.
- 9. PLC standard Function No. 9 – Intrusion:
 - a. Intrusion detection shall be provided where noted. Provide entry and exit time delays.
 - b. Provide intrusion detection ENABLE/DISABLE capability from the OIU System.
- 10. PLC Standard Function No. 10 – VFD Sequence of Operations:
 - a. Functionality and configuration of the VFD shall be taken into consideration during application software development, testing and operation.
 - b. HIM keypad REMOTE/LOCAL and START buttons configuration:
 - 1 The REMOTE/LOCAL and START buttons will be permanently disabled. Note: speed control via the HIM will still be functional.
 - c. Switch in AUTO mode:
 - 1 VFD receives a call to run from the PLC via an interposing relay and a speed reference.
 - 2 PLC receives all VFD parameters via the process network communications; the HIM module (on the VFD) is active and displays selected parameters.
 - 3 The HIM (keypad) is in REMOTE mode.
 - d. Switch in HAND mode:
 - 1 VFD receives a call to run and speed reference that is hard wired (i.e. not from the HIM).
 - 2 PLC receives all drive parameters via the process network communications, the HIM module is active and displays selected parameters.
 - 3 The HIM (keypad) LOCAL/REMOTE mode will be disabled by OTHERS.
 - e. Switch in OFF mode:
 - 1 PLC receives all drive parameters via the process network communications, the HIM module is active and displays selected parameters.
 - 2 VFD is blocked from running.
 - 3 The HIM (keypad) is blocked from starting the VFD.

2.02 PLC FUNCTIONAL REQUIREMENTS

- A. The Control Systems Integrator shall provide all PLC application software programming necessary for a fully functional and operable system. PLC programming shall include, but shall not be limited to:
1. I/O and register addressing assignments.
 2. Applications software development and installation.
 3. PLC equipment configuration
 4. PLC interface to OIU System.
 5. System Testing.
 6. Applications Software debugging and testing.
 7. System hardware and software documentation.
 8. PLC system startup.
 9. PLC system training.
- B. PLC Memory Allocation
1. Make logical, structured groupings of PLC memory registers. Registers shall be grouped by program function. Register memory groupings shall be consistently applied where identical functions exist on more than one PLC. Example of functional groupings are:
 - a. Analog input processing
 - b. Analog output processing.
 - c. Alarm handling.
 - d. Status signal communication to all OIUs.
 - e. Command signal communication from any OIU.
- C. PLC Program Structure: Divide the PLC program into logical program groups. Each program group shall contain the programming for a process or set of equipment.
- D. PLC Program Documentation:
1. Each PLC program shall be fully annotated with descriptive notations that define the functions associated with each program element. Provide the following minimum level of program documentation:
 - a. Ladder logic and any other control algorithms.
 - b. Database.

c. Communications narrative.

2. The program documentation shall be developed using the PLC supplier's standard program documentation software. The PLC program documentation shall also include a complete cross reference listing of all program elements and their location within each program

E. Nuisance Alarms:

1. Configure the System to eliminate nuisance alarming. Nuisance alarms shall be corrected without additional cost to the Owner.
2. Provide alarm time delays (where required) to account for normal startup/shutdown functions to occur without generating a nuisance alarm.
3. Included in the System shall be situations when equipment is not powered or not in AUTO. For example, when equipment is taken out of service, the status of associated hardwired control switches and SCADA Auto switches shall be interlocked with the alarm logic in order to eliminate a nuisance alarm.

F. Equipment Auto Restart:

1. Provide PLC logic to automatically restart equipment that was operating in AUTO when plant power failed and was restored (and/or transitions between backup generator and normal power supply). Provide staggered restart time delays, per equipment, to prevent electrical distribution system overloading or tripping of breakers during the restart sequence. A list of staggered restart time delays, per equipment, will be determined and documented in the final O&M Manuals by the Control Systems Integrator.

G. Facility Control and Operating System programming Coordination Meetings:

1. Prior to the start of facility control or operating system development programming, coordinate program development with the Owner and/or Engineer.
 - a. Review the specified control functional requirements, equipment specifications, P&ID's and all drawings.
 - b. Resolve questions regarding the control programming and operator interface requirements.

2.03 OIU SYSTEM FUNCTIONAL REQUIREMENTS

A. The Control Systems Integrator shall provide all OIU system applications software configuration necessary for a fully functional and operable OIU system.

1. The Control Systems Integrator shall provide applications software configuration for the following OIU Systems:
 - a. LCP A.
2. OIU system configurations shall include, but shall not be limited to:

- a. System applications software configuration development.
- b. OIU equipment configuration.
- c. OIU system interface to PLC system.
- d. OIU System Ethernet communications network configuration and testing.
- e. All data read from or written to the PLC, VFDs and power monitors shall be configured and communicated via PLC registers.
- f. System hardware and application software documentation.
- g. OIU system startup.
- h. OIU system maintenance.

B. OIU System Point Database:

- 1. Configure the OIU system point database to include all status and control signals monitored by the PLC and OIU Systems.
- 2. Point tag names shall be created using a naming convention that is descriptive of the signal function.
- 3. Point tag numbers shall be consistent with those shown on the Drawings.
- 4. Where input I/O points (DI or AI or network) have been noted as "FUTURE", include these points in the configured tag database. Include duplicate, edited displays for the "FUTURE" units and unit processes. Provide display navigation functions to, from and associated with these displays, but do make them functional. Use the associated information and link these tag points to the associated I/O point. Provide the associated controls interface information on the SCADA graphic displays (using gray symbols and gray text when showing them on the display). NOTE: The purpose of this requirement is to reserve space for these future items in the tag database, on the graphic displays, and to facilitate future addition of these systems.

C. OIU System Communications:

- 1. Status Alarm Signal to the OIU System: The OIU shall continuously poll the PLC, etc. for status and alarm signals required to support the OIU System and data collection functions specified.
 - a. Discrete Status Signals:
 - 1 All discrete status signals shall be shown on the OIU System graphic displays in the format specified.
 - 2 Log critical status signals to the OIU system alarm/event function, and to the system alarm log file. Whether shown on the P&ID's or not, all field connected input points shown on the drawings shall be displayed on their associated graphic display screens.

b. Discrete Alarm Signals:

- 1 All discrete alarm signals shall be shown on the OIU System graphic displays in the format specified.
- 2 Log all alarm signals to the OIU system alarm/event function, and to the system alarm log file.
- 3 Whether shown on the P&ID's or not, all field connected input alarm points shown on the drawings shall be displayed on their associated graphic display screens and configured into the specified alarm handling functions.

c. Analog Status Signals:

- 1 All analog process status signals shall be received from the PLC system as values scaled to the actual process engineering units.
- 2 All analog status signals shall be shown on the OIU System graphic displays in the format specified.
- 3 Whether shown on the P&ID's or not, all field connected input points shown on the drawings shall be displayed on their associated graphic display screens and configured into the specified alarm handling functions.

2. Command Signals from any OIU: The OIU System shall transmit operator command signals to the PLC systems as specified.

- a. Discrete Command Signals: All discrete command signals shall be transmitted to the PLC systems immediately upon the next scan of the associated PLC.
- b. Analog Command Signals: All analog command signals shall be transmitted to the PLC systems immediately upon the next scan of the associated PLC. All analog command signals shall be transmitted to the PLC systems scaled to the engineering units applicable for the associated process as specified.
- c. Each analog command signal shall have configured high and low data entry limits. The OIU system shall be configured to reject any command value outside of the data entry limits via pop-up dialog box message.
- d. Command values issued at one OIU shall be transmitted to the other system computers and stored in these systems' point databases.

3. Provide diagnostic alarms on the OIU System upon any communications malfunction between the OIU and all systems or components that it is communicating with.

D. Discrete Status Display:

1. Motor Driven Equipment: Indicate equipment status on graphic displays with both text and graphic symbols as follows:

- a. RUNNING (green)
 - b. OFF (white)
 - c. READY (red); ready = in AUTO, REMOTE or the unit is capable of running
- 2. Gates and Valves: Indicate equipment status on graphic displays with both text and symbols as follows:
 - a. OPEN (green)
 - b. CLOSED (red)
- 3. Alarm Conditions: Indicate alarm conditions on graphic displays with text as follows.
 - a. ALARM, Unacknowledged (flashing yellow)
 - b. ALARM, Acknowledged (yellow)
 - c. Normal (invisible).

E. Analog Status Display:

- 1. Display analog signals on graphic displays as numeric and bar graph symbol displays. All process variables are to be displayed in engineering units (i.e. gpm, gallons, feet, mg/l, etc.). Except for power monitoring variables, all variables shall be displayed in vertical bar-graph format with digital readout in the bottom of the bar graph. Power monitoring variables shall be displayed in circular indicator fashion (also with digital readout in the bottom of the indicator), similar to meters typically seen on electrical gear.
- 2. Numeric displays of floating point numbers shall be configured to one decimal place except as defined below:
 - a. Numeric display of analytical instrument signals such as pH, DO and chlorine residual shall be configured to two decimal places.
- 3. Use bar graph symbol displays with digital readouts to indicate tank fill levels.

F. Alarm Processing:

- 1. Configure all alarms monitored or generated by the system. Provide alarm annunciation, acknowledgement, and alarm logging at each OIU for all alarms monitored by the system.
- 2. Provide an operator friendly method of exporting alarms (that have been logged to the system alarm log file) to a PC in text or Excel format. Step-by-step instructions on operator use of this method shall be included on a dedicated instruction screen(s) and in the Operations and Maintenance Manual.
 - a. Provide a minimum of two levels of alarm status. Assignment of alarm status shall be decided by the OWNER.

- 1 Critical
- 2 Non-critical.

G. OIU System Security:

1. Provide the following levels of system security with the associated system privileges:
 - a. Supervisor Level: Global System Functions.
 - b. Operator Level: All system functions with the exception of:
 - 1 Elapsed time meter reset
 - 2 OWNER and ENGINEER defined set point adjustments.
 - c. Display Only Level: Only display viewing capabilities.

H. PLC Timer Presets: Provide OIU System access to PLC system timer presets for sequence and control functions as specified.

I. Maintenance Status Display(s):

- 1 Tabular format,
- 2 Includes equipment run time and number of start,
- 3 Run times and number of start to be operator resettable,
- 4 Displays miscellaneous non-critical alarms that don't appear on process graphic displays,

J. Printer Setup: Configure alarm/event and report printers for printing of all logged messages, alarms, screen displays, reports, and other non-logging printouts.

K. Historical Trending: Configure historical data collection within the new OIU system to include all specified points on the drawings. All logged trend information will be stored on each OIU system using the standard functions of the system software.

1. Access to Historical Data:
 - a. Provide a step-by-step procedure for operator access,
 - b. Provide an operator friendly method of exporting trend data to a PC via a USB memory stick in CSV or Excel format. Step-by-step instructions on operator use of this method shall be included on a dedicated instruction screen(s) and in the Operations and Maintenance Manual.

L. Graphic Displays: The Control Systems Integrator shall create graphic displays as specified and as required to efficiently and effectively operate the facility. The Control Systems Integrator shall coordinate the graphic display development with the OWNER and ENGINEER.

1. Provide a complete set of graphic displays that provide the functions and capabilities specified.
2. Overview Graphic Displays:
 - a. The overview graphic displays shall provide overview and detail display of individual unit processes. The overview graphic displays shall have the following display and operator interface capabilities:
 - 1 Display process flow streams with labels and color coding.
 - 2 Illustrate process items such as piping, flow meters, and instrumentation.
 - 3 Illustrate major equipment items such as pumps, valves, and motors.
 - 4 Display equipment operational status and alarm conditions.
 - 5 Display process variable signals and values.
 - 6 Display electrical power system schematic and status.
 - 7 Provide graphic targets for selection of control functions and access (navigation) to associated graphic displays.
 - b. Provide the overview graphic displays list in the Display Table.
 - c. Provide additional displays associated with the overview displays, as required, meeting the requirements of this specification.
3. Pop-Up Command Displays:
 - a. All operator commands shall be entered through pop-up displays. The pop-up displays shall be accessed through selection of graphic targets configured on associated process graphic displays.
4. Alarm Displays:
 - a. Provide alarm summary and alarm history displays. Each display shall be configured in a tabular listing format using the alarm display utilities provided standard with the OIU system software.
 - b. The alarm summary display shall only display active alarm conditions.
 - c. The alarm history display shall display all alarms received by the OIU System. All alarms listing messages shall be time and date stamped and shall have a description of the alarm condition (i.e. in alarm, acknowledged, returned to normal).
 - d. Provide page up and page down scrolling controls on each alarm display.
 - e. Provide controls for selecting between alarm summary and alarm history displays on each graphic.

5. Real Time Trending Displays
 - a. Real time trend displays shall be pop up displays that are configured to display the data in a time format.
 - b. Real time trends shall be accessed through selection of graphic targets on a process graphic overview graphic display.
6. Historical Trending Display:
 - a. Provide a display configured for operator selection of up to 8 process signals logged to the historical data collection system.
 - 1 Provide a slider bar on the trend display that allows selection of time points along the trend chart.
 - 2 Provide display of the process signal values associated with the slider bar time selections.
 - 3 Provide display zoom capability that automatically adjusts the trend time scale.
 - 4 Provide time scale increase and decrease push-button controls that will adjust the trend display time scale without requiring the operator to access the trend display configuration dialog box.
7. Control Timer Display: provide a graphic display that gives user access to change all timers associated with the following functions:
 - a. Equipment Start-Stop delay timers.
 - b. Alarm delay timers.

3.00 SOFTWARE LOOP FUNCTIONAL SPECIFICATIONS

3.01 GENERAL

- A. These functions have been included to supplement the information provided on the drawings and specifications (particularly section 16928).
- B. Include PLC logic for future items:
 1. Copy and edit logic for current units,
 2. Change registers and status/alarm bits to the ones assigned/reserved for these future items,
 3. Assigned/reserved registers and status/alarm bit assignments for future units shall follow the same sequence and numbering assignment as units initially being installed.

3.02 MISCELLANEOUS FUNCTIONS AND REQUIREMENTS

- A. Historical functions and logging of information shall be adjustable by supervisor access. The Owner and Engineer shall agree upon initial historical logging settings. Adjustments to logging shall be made by operations personnel with supervisor password access.
- B. Minimum, maximum, and average flows, discharge and suction pressures, etc. values shall be reset daily at mid-night at which time the new calculations begin.
- C. Totalized flows, equipment run times, and equipment number of starts shall be re-settable by operations personnel.
- D. All analog inputs shall be alarmed if their respective 4 to 20 milliamp signal is determined to be out of range (i.e. loss of power, less than 4 or greater than 20). Out of range shall be designated as OOR in the alarm log message.
- E. All alarming set points shall be adjustable by operations personnel with supervisor password access.
- F. The term "SCADA Manual Control" shall be defined as: control of equipment by an operator from the OIU System. This control shall only be performed when the equipment's HAND-OFF-AUTO (or REMOTE) hand switch is in the AUTO (or REMOTE) position and the unit is not in alarm.
- G. The term "SCADA Auto Control" shall be defined as: automatic control of equipment by the OIU System based on operator entered set points and changes in associated process variables that call for automatic operation of the equipment. This control shall only be performed when the equipment's HAND-OFF-AUTO (or REMOTE) hand switch is in the AUTO (or REMOTE) position and the unit is not in alarm.
- H. Failure of a piece of equipment (for example OVERLOAD, etc.) shall cause the PLC to lockout the equipment from running in AUTO mode. Reset of equipment shall be performed by putting the control switch in the OFF (or HAND) position and back to AUTO for OIU control.
- I. PLC FAIL/TROUBLE - indication will be provided by a graphic indicator on the SCADA PLC System status display. This indicator will be lit when the PLC has a system fault or is not operating as expected.
- J. ALARM and EVENT SUMMARIES - a graphic display(s) for alarm and event summary shall be provided.
- K. Receive, install, program, and configure the operator interface software.
- L. Receive, install, program, and configure the Ethernet network and network software
- M. Receive and display the specified communications status information provided by the PLC system, the process network connected equipment, and the UPS.

3.03 MISCELLANEOUS PROCESS VARIABLE, STATUS AND/OR ALARM FUNCTIONS (TYPICAL FOR LOOPS XX-XX-XX, WHERE "XX" EQUALS AREA, DESCRIPTION, AND LOOP NUMBERS SHOWN ON P&IDS AND/OR DRAWINGS)

- A. General: Individual loop descriptions for miscellaneous process variables, status and/or alarm monitoring have not been included. Contractor shall provide monitoring and/or alarming functions as

shown on the associated P&ID's and all drawings. Provide status and/or alarm monitoring functions as described in the "standard functions" descriptions in this Section.

- B. Loop descriptions provided below are intended to supplement the information provided in the drawings and other project specifications.

3.04 HEAT DETECTOR (LOOP YI-HD)

- A. General: Monitors Heat detector as shown on the drawings.
- B. Local Control: None.
- C. SCADA Manual Control: None.
- D. SCADA Automatic Control: Monitor status of alarm and route condition to the OIU for display, logging and report generation.

3.05 LOCAL CONTROL PANEL LCP UPS (LOOP UPS ALARM)

- A. General: Monitors UPS low battery contact.
- B. Local Control: None.
- C. SCADA Manual Control: None.
- D. SCADA Automatic Control: Monitor status of alarm and route condition to the OIU for display, logging and report generation.

3.06 MOTOR CONTROL CENTER DPM (LOOP YA-MCC-1,2)

- A. General: Monitors digital power meter values via Ethernet network.
- B. Local Control: None.
- C. SCADA Manual Control: None.
- D. SCADA Automatic Control: Monitor status of power system and routes variables and condition to the OIU for display, logging and report generation.

3.07 PUMP ROOM TEMPERATURE TRANSMITTER (LOOP TI-01)

- A. General: Monitors the pump room temperature.
- B. Local Control: None.
- C. SCADA Manual Control: None.
- D. SCADA Automatic Control:
 - 1. Monitor the room temperature and routes variables and condition to the OIU for display, logging and report generation.

2. Provide Operator adjustable high and low alarm setpoints.

3.08 AUTOMATIC TRANSFER SWITCH POSITION (LOOP YA-ATS)

- A. General: Monitors the position of the automatic transfer switch.
- B. Local Control: None.
- C. SCADA Manual Control: None.
- D. SCADA Automatic Control:
 1. Monitor status of switch (normal or generator) and route condition to the OIU for display, logging and report generation.
 2. Monitor status of power (normal or generator) and route condition to the OIU for display, logging and report generation.

3.09 DOOR INTRUSION (LOOPS YI-HD)

- A. General: Monitors door switch status.
- B. Local Control: None.
- C. SCADA Manual Control: None.
- D. SCADA Automatic Control: Reference PLC Standard Function No. 9.

3.10 INSTANTANEOUS FLOW METER (LOOP FI-01,02)

- A. SCADA Manual Control: None.
- B. SCADA Automatic Control:
 1. Monitor status of magnetic flow indicator/transmitter output and route to the PLC. Totalize flow in the PLC. Route effluent flow and totalized effluent flow to the OIU for display, logging and report generation.

3.11 ACTIVE HARMONIC FILTER (LOOP YI-HF1)

- A. General: Monitors the condition of the active harmonic filter
- B. Local Control: None.
- C. SCADA Manual Control: None.
- D. SCADA Automatic Control:
 1. Monitor status of the filter (Running, at 100%, fail, alarm) and route condition to the OIU for display, logging and report generation.

3.12 EMERGENCY GENERATOR (LOOP GEN)

- A. General: Monitors the condition of the emergency generator
- B. Local Control: None.
- C. SCADA Manual Control: None.
- D. SCADA Automatic Control:
 - 1. Monitor status of the generator (Running, Trouble, Shutdown, Low batter voltage) and route condition to the OIU for display, logging and report generation.

3.13 PUMP ROOM FLOOD SWITCH (LOOP YA-FD)

- A. General: Monitors the condition of pump room flood swithc
- B. Local Control: None.
- C. SCADA Manual Control: None.
- D. SCADA Automatic Control:
 - 1. Monitor status of the switch and route condition to the OIU for display, logging and report generation.

3.14 EXHAUST FAN (LOOP FAN)

- A. General: Monitors the temperature of the room and if A/C is running and decides when to operator exhaust fan.
- B. Local Control: The exhaust fan has a Hand/Auto Switch. If the Hand/Auto switch is in Hand, the exhaust fan will start provided the motor is not faulted.
- C. SCADA Manual Control: None.
- D. SCADA Automatic Control:
 - 1. Exhaust fan will run only if the room temperature is above 80 degrees and the A/C is not running.

3.15 DISCHARGE AND SUCTION PRESSURE TRANSMITTERS (LOOPS HIGH DISCHARGE AND LOW SUCTION)

- A. SCADA Manual Control: None.
- B. SCADA Automatic Control:
 - 1. Monitor status of pressure indicator/transmitter output and route to the PLC. Route pressure values to the OIU for display, logging and report generation.
 - 2. Provide Operator adjustable high and low alarm setpoints.

3. Reference pump control loops for additional information.

3.16 BOOSTER PUMPS (LOOPS P1, P2, P3, P4 AND P5)

- A. Local Control: Each pump has a HOA switch and digital speed adjustment at the VFD. Each pump is equipped with an over-temperature switch, high discharge and suction pressure transmitter. The over-temperature switch, high discharge and suction pressure transmitters will shut down the pump and/or prevent the unit from starting until RESET, and initiate as SCADA alarm. If the HOA switch is in HAND, the VFD will run provided the above required run conditions are satisfied. The HOA switch is required to be in AUTO for SCADA Automatic control.
- B. SCADA Manual Control: In "MANUAL" mode the operator starts/stops the pumps and adjusts speed via the process graphic display(s) on the OIU System.
- C. SCADA Automatic Control: Pumping system shall consist of 5 booster pumps: one small HP Jockey pump, two 5HP Duty pumps, and two 50HP Fire pumps
 1. All pumps will be operated using variable frequency drives (VFD) which will adjust pump RPM to maintain a user defined discharge pressure to be initially set at 75 psi measured via pressure transducer located on the discharge manifold. When more than one pump operates, all pumps shall operate at the same percentage of full speed RPM.
 2. Pumps shall be turned on/off based on pressure transmitter & pump RPM percentage. Following are preliminary on/off settings for each pump. Final settings will be determined during startup, and all set point shall be adjustable via OIC display
 - a. Jockey Pump (small HP) will run continuously
 - b. Duty Pump 1 (5HP) will turn on if pressure drops below 70 PSI and Jockey Pump RMP is greater than 80% and will shut down if pressure is above 75 PSI and Jockey Pump RMP is below 30%
 - c. Duty Flow Pump 2 (5HP) will turn on if pressure drops below 70 PSI and Duty Pump 1 RMP is greater than 80% and will shut down if pressure is above 75 PSI and Duty Pump 1 RMP is below 30%
 - d. Fire Pump 1 (50HP) will turn on if pressure drops below 70 PSI and Duty Pump 2 RMP is greater than 80%. Pumps 1, 2, and 3 will all shut down while Fire pump 1 is in operation. Pump will shut down when PSI is above 75 and its RPM is below 30%. Pumps 1,2 and 3 will turn on as Fire Pump 1 is shutting down.
 - e. Fire pump 2 (50HP) will turn on if pressure drops below 70 PSI and Fire Pump 1 RMP is greater than 80% and will shut down if pressure is above 75 PSI and Fire Pump 1 RMP is below 30%
 3. VFD ramp up/down time setting during pump on/off shall be set to provide smooth transition (i.e. no pressure drops/spikes) when pumps are turned on/off. Control system shall provide averaging for Pressure transmitter reading to ensure pumps don't turn on/off during momentary flow spikes/decrease (setting to be determined during startup).

4. In the event the jockey flow pump is out of service due to any failure or for repair/maintenance or for any other reason the system shall automatically detect that the pump is not in service and/or not pumping and will utilize one of the Duty flow pumps in place of the jockey flow pump until the jockey pump is back in service. This shall include using the duty pump to maintain the preset discharge pressure.
5. In the event one of the duty flow pumps or one of the fire pumps is out of service due to a failure or for repair/maintenance or for any other reason the control system will automatically adjust the pump on/off flow rates to accommodate the system while the pump is out of service. The system shall also generate a dial-out alarm indicating which pump is out of service
6. Both Duty and Fire pumps shall alternate lead/lag each operation to provide even use.
7. Route all variables, alarms and condition status to the OIU for display, logging and report generation.

4.00 EXECUTION

4.01 FACTORY TESTING

- A. The Programmer shall perform two phases of operational testing of the application software. The first phase of testing shall be unwitnessed and shall be conducted on all communications, monitoring, control, alarm handling. Data collection, archiving and report generation shall be simulated as much as is practical following discussions on approach, data collection, and trending simulation methods and content with the Engineer prior to the start of the test. The Programmer shall complete unwitnessed testing and sign-off completed I/O test results using the I/O checklist specified below. After this first phase is complete, the second phase shall commence which includes the following witnessed factory testing;
- B. Control Systems Integrator or Programmer shall notify the Engineer a minimum of 5 working days prior to the start of the factory testing (second phase).
- C. Phase two testing shall include:
 1. Communications with all system components provided to, and provided by, the Control Systems Integrator;
 2. Energizing all digital inputs and outputs and confirming their proper operation in the PLC and throughout the HMI and OIU system;
 3. Simulating each analog input and output using a loop isolator calibrator and confirming their proper operation in the PLC and throughout the HMI and OIU system;
 4. All spare (or future) points shall be tested to/from their terminal blocks for continuity.
- D. Provide an I/O checklist for all points and specified functions. All hardwired and software-based points and functions in the system shall be tested. This shall include, but not be limited to the process network, serial, and all other communications methods, mediums or protocols used or specified to be provided in the system. Provide an I/O checklist for factory testing and one for functional acceptance testing at the

jobsite. For each point, the I/O checklists shall include the following information (where applicable) and method of indicating that the functional testing has been performed:

1. Tag name;
2. Description;
3. Point function tested (i.e. digital set/reset, analog at 0%, 25%, 50%, 75% and 100% of range);
4. Analog signal scale range and units confirmation;
5. Time delay function tested;
6. Software function(s) tested;
7. Trending function tested;
8. Alarm notification function tested;
9. An area for notes or comments;
10. Date of test;
11. Signature line for persons performing and witnessing test.

E. Control Systems Integrator shall conduct testing for witnessing by the Engineer and/or Owner. Provide for all time, equipment, support, and materials required to complete this testing, at no additional cost to the Owner.

F. Testing shall include time required by the Engineer and/or Owner to observe and verify any modifications or revisions to the application software noted during testing.

G. Operational I/O testing shall be by installation of a test program rather than reading/writing of PLC I/O via registers and/or data.

4.02 FUNCTIONAL ACCEPTANCE TESTING

A. The Programmer shall perform two phases of operational testing of the application software in the field. The first phase of testing shall be unwitnessed and shall be conducted on all communications, monitoring, control, alarm handling, data collection, archiving, report generation, remote access and all other specified functions. Testing shall be conducted based on the approach and testing methods agreed to with the Engineer prior to the start of the test. After this first phase is complete, the second phase shall commence which includes the following witnessed field testing;

B. Control Systems Integrator or Programmer shall notify the Engineer a minimum of 5 working days prior to the start of the functional acceptance testing.

C. Testing shall include:

1. Communications with all system components;

2. Specified functions of all digital and analog inputs and outputs and confirming their proper operation in the PLC and throughout the HMI, OIU systems;
 3. All spare (or future) points shall be tested to/from their terminal blocks for continuity.
- D. Provide an I/O checklist for all points and specified functions. Provide an I/O checklist for factory testing and one for functional acceptance testing at the jobsite. For each point, the I/O checklists shall include the following information (where applicable) and method of indicating that the functional testing has been performed:
1. Tag name;
 2. Description;
 3. Point function tested (i.e. digital set/reset, analog values at 0%, 25%, 50%, 75% and 100% of range);
 4. Analog signal scale range and units confirmation;
 5. Time delay function tested;
 6. Software function(s) tested;
 7. Trending function tested;
 8. Report generation function tested;
 9. Alarm notification function tested;
 10. An area for notes or comments;
 11. Date of test;
 12. Signature line for persons performing and witnessing test.
- E. Control Systems Integrator shall conduct testing for witnessing by the Engineer and/or Owner. Provide for all time, equipment, support, and materials required to complete this testing, at no additional cost to the Owner.
- F. Testing shall include time required by the Engineer and/or Owner to observe and verify any modifications or revisions to the application software noted during testing.
- G. At the discretion of the Engineer, operational I/O testing shall be by installation of a test program or by using the actual SCADA system program.
- 4.03 SYSTEM VALIDATION TEST
- A. System-wide testing shall be conducted to demonstrate proper system startup/shutdown functions, that nuisance alarms are not created, etc. Control Systems Integrator and Programmer shall provide for their required staff to be present during the system-wide testing.

- B. Following successful completion of the system validation test the application software shall be considered to be Substantially Complete.

4.04 SYSTEM MAINTENANCE

- A. The Programmer shall be responsible for all maintenance of the system software and application software from the beginning of the Field-Testing until acceptance. Programmer shall correct all deficiencies and defects and make all repairs, replacement, modifications, and adjustments as malfunctions occur. Programmer shall perform all such work required by the Owner or Engineer to cause and maintain proper operation of the system until acceptance.

4.05 TRAINING

- A. Conduct training sessions in the operation and maintenance of the control system for personnel employed by the Owner. Conduct training sessions to educate and train operations personnel in the maintenance and operation of all components provide by the Control Systems Integrator. Training shall include:

1. Equipment operational training;
2. Alarm handling operation;
3. System backup and restore functions;
4. Trouble-shooting;
5. Calibration;
6. Testing;
7. Component replacement;
8. Automatic versus manual mode operation
9. Manual mode operation.

- B. At least 1 session 4 hours in duration each.
- C. Provide specific instruction materials for pupil use during training. Provide one set of all training materials for each of the attendees. Provide for up to 4 pupils per class.
- D. Owner reserves the right to videotape any or all training sessions for unlimited use at later date(s).

4.06 OPERATIONS AND MAINTENANCE MATERIALS

- A. Prepare and assemble detailed operations and maintenance manuals. As a minimum, all Manuals shall include the following:
 1. Equipment operational mode training;
 2. Detailed description of the alarm handling operation;

3. System backup and restore functions;
4. Individual and system-wide trouble-shooting guidelines;
5. Calibration;
6. Testing;
7. Component replacement;
8. Automatic versus manual mode operation;
9. Manual mode operation;
10. Application software documentation hardcopy printouts and electronic copies (specified above);
11. A minimum of one complete system configuration backup on CD-ROM.

B. Provide 7 copies.

END OF SECTION

**SECTION 16928
CONTROL SYSTEM**

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
 - 1. Division 16 Section "Motor Control Centers".
 - 2. Division 16 Section "Process Instrumentation Meters and Transmitters".

1.2 SUMMARY

- A. Work and materials specified in this section include the system for control and monitoring of motor driven pumps and equipment and all component instruments and sensing devices.
- B. Included in this work is the furnishing and testing of the motor control centers (MCC), all motor controllers and all interconnecting control wiring between the control system equipment, switchboard, automatic transfer switches, instrumentation, Packaged Equipment, PLC's, LCP's, MCC and other devices.
 - 1. Also included is the modification, testing, installation and programming of Owner provided local control panels (LCP's).
 - 2. Contractor shall coordinate with City to receive the local control panels in Moscow.

1.3 DEFINITIONS

- A. Contractor: The Contractor, sometimes referred to as the "Prime Contractor" or "General Contractor", is the party who furnishes and installs all tools, materials and equipment, and has a formal contract with the Owner. The Contractor is responsible for the work of the Electrical Contractor, Control System Integrator (C. S. I.), and all other Contractors and Sub-Contractors.
- B. Electrical Contractor: The Electrical Contractor is the party who furnishes and installs all non-control electrical equipment and power distribution equipment and infrastructure.
- C. C. S. I.: Control System Integrator is the party that furnishes all control components, configures the control system and provides all documentation, designs the detailed control wiring diagrams plus the layout and assembly of the custom control panels.

- D. Control System: The Control System includes all equipment, instruments and wiring for control and monitoring of all operating pumps and equipment. This includes custom control panels, motor control center, packaged control panels, and control equipment furnished with other systems and mechanical equipment. All sensing, transmitting, indicating, control and recording of all functions as specified and shown are also included in the control system.

1.4 SYSTEM DESCRIPTION

- A. The control system shall include the instruments, control devices, programmable controllers, input and output devices, sensors, interfacing devices, cabinets, enclosures and other components indicated and implied by the Plans and these Specifications.
- B. The control system shall be designed and assembled by the C. S. I. to provide:
 - 1. Control of motor driven pumps and equipment.
 - 2. Monitoring of operation of motor driven pumps and equipment.
 - 3. The capabilities indicated and implied by the plans and specifications.
 - 4. Programming of the programmable controller (PLC) shall be provided and shall be included in the Contractors Bid price.
- C. The control system shall be designed and assembled by the C. S. I. to be an integrated system composed completely of components which are specifically designed and used for and in conjunction with control and operation of motor-driven pumps and equipment. All components shall be standard, catalog-listed products, new and free of defects.
- D. The control system shall be supplied by the C. S. I. as an integral, complete system with all required components including all interfacing equipment, appurtenances and accessories and all such devices which may be required for proper interfacing as part of the control system.
- E. The control system shall include the following major components:
 - 1. Remote operator indication and interface devices as shown on the drawings.
 - 2. Motor Control Centers and associated equipment.
 - 3. Level, flow, pressure instruments, switches, etc.
- F. The Control System shall include all Ethernet IP assignments, configuration and testing.

- G. Contractor shall attend an On-Site pre-submittal meeting with the General Contractor, Electrical Contractor, Control Systems Integrator, OWNER and Engineers prior to submittals.

1.5 RESPONSIBILITY OF ELECTRICAL CONTRACTOR AND C. S. I.

- A. The C. S. I. shall be fully and completely responsible for the design and assembly of the control system as specified herein and shall be enjoined by the Electrical Contractor as a supplier of custom control equipment. The assignment of specific responsibilities herein to the C. S. I. shall not, in any way and under any conditions, diminish or usurp the General or Electrical Contractor's full and complete responsibility for all work performed and all materials installed under the contract. The contract between the Electrical Contractor and the C. S. I. shall specifically require that the C. S. I. conform to and meet all requirements specified herein.
- B. The Electrical Contractor's responsibilities include the following:
 - 1. Reviewing the C. S. I.'s submittals and wiring diagrams for coordination with space requirements, raceway requirements of field wiring, etc.
 - 2. Supplying the C. S. I. with submittals of equipment related to the power and control systems which the C. S. I. must include in their submittals and integrate. Such as motors, packaged control panels which the C. S. I. does not build, etc.
 - 3. Installation of the control panels.
 - 4. Installation of the standby power set, automatic transfer switch and power distribution.
 - 5. Installation of the interconnecting wiring per the C. S. I.'s wiring diagrams.
 - 6. Installation of sensors and actuators per detailed contract drawings or drawings or instruction supplied by the C.S.I.
- C. The C. S. I.'s responsibilities include the following:
 - 1. Supply motor control centers.
 - 2. Accept, modify and provide factory acceptance testing of Owner provided local control panels.
 - 3. All interconnecting wiring of control equipment including remote control panel, pump panel, packaged equipment panels, mechanical equipment with control components, etc.
 - 4. Testing and inspection of local control panel, motor control center, automatic transfer switches and control panel in C. S. I.'s shop.

5. Coordinate with the Electrical Contractor for specific requirements and locations of raceway penetrations and field wiring in control panels.
6. The C. S. I. shall supply the Electrical Contractor with all necessary detailed installation drawings and/or written instruction for installation of all control components and sensing devices for proper system operation.

1.6 STANDARDS AND CODES

- A. All equipment and materials shall conform to the latest revised editions of applicable standards published by the following organizations:
 1. American National Standards Institute (ANSI).
 2. Institute of Electrical and Electronic Engineers (IEEE).
 3. National Electrical Manufacturers Association (NEMA).
 4. Underwriters' Laboratories (U/L).
 5. Instrument Society of America (ISA).
 6. National Fire Protection Association (NFPA)
- B. All electrical equipment and materials, and the design, construction, installation, and application thereof shall comply with all applicable provisions of the National Electrical Code (NEC), the Occupational Safety and Health Act (OSHA), and any applicable Federal, State, and local ordinances, rules and regulations.
- C. All materials and equipment specified herein shall within the scope of UL examination services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.
- D. All control panels shall bear a label by UL or by an approved testing authority for the completed assembled panel.

1.7 ACTION SUBMITTALS

- A. Per the submittal requirements of Sections 01300 and 16012 and the following, The C. S. I. shall develop and shall submit to the Engineer, through the Electrical Contractor, the following project data:
 1. All shop drawing revisions: (provide an electronic copy, in AutoCAD, of all shop drawings on disk to the Engineer with the submittals and with final as-built drawings).

2. Cut sheets for all products with a Bill of Materials showing quantity, manufacturer, catalog number, the supplier name and phone number, and relevant spec. paragraph number. Number each item in the Bill of Materials and relate the Bill of Materials to the submitted product index.
 3. I/O checklist that verifies that all control and status/indication points in the control panels both implemented and spare have been tested. One copy of the I/O Checklist shall be submitted for the start of the Factory Test. One copy of the I/O Checklist shall be submitted prior to the Control system startup.
 4. PLC I/O list showing any modifications after Factory Testing has been completed.
 5. Ethernet IP network addressing and configuration map.
- B. Provide reference numbering on all cut sheets to relate them to the bill of materials. Provide same reference numbering by the equipment shown on the shop drawings.
- C. Cutsheets may be submitted via one of the two following methods:
1. Submit cutsheets bound in a 3-hole binder with tabs and bill of materials in the front – provide at least 1 tab for every 4 products.
 2. Submit cutsheets in electronic PDF format with a bill of materials in the front. PDFs shall have bookmarks for each product and be neatly legible. PDFs that are not bookmarked and product cutsheets that are illegible will be rejected by the Engineer.

1.8 INFORMATIONAL SUBMITTALS

A. Field Test Reports:

1. At the completion of the field testing required by paragraph 3.2 of this Section. The C.S.I. shall develop and submit to the Engineer a Field Test Report that includes the following:
 - a. I/O Checklist.
 - b. Problems encountered and remedial action taken including, but not limited to:
 - 1) Programming Issues.
 - 2) Incorrect Wiring.
 - 3) Faulty or uncalibrated equipment, instrumentation or components.

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4) Communications Issues.

2. Field Test Reports must be submitted prior to requesting validation testing from the Engineer.

B. Operation and Maintenance Training

1. Develop and submit operation and maintenance training materials for the instruction of Owner and/or Owner's personnel and submit to the Engineer at least (2) weeks prior to conducting the training.
2. After the completion of the training, the C.S.I shall submit copies of the instruction materials to the Engineer signed by all personnel that received instruction.

1.9 CLOSEOUT SUBMITTALS

A. OPERATION AND MAINTENANCE DATA

1. The C. S. I. shall prepare and assemble detailed operation and maintenance manuals in accordance with the project general requirements. The manuals shall include, but not be limited to, the following:
 - a. Preventative maintenance procedures.
 - b. Trouble-shooting.
 - c. Calibration.
 - d. Testing.
 - e. Replacement of components.
 - f. Automatic mode operation.
 - g. Programming.
 - h. Manual mode operation.
 - i. Interface navigation.
 - j. Setpoints and Variables.
 - k. Control System Security.
 - l. Alarms.

- m. System schematics / shop drawings.
 - n. Electronic copy on disk of all shop drawings in version of AUTOCAD acceptable to Owner.
 - o. As-built wiring diagrams of cabinet and enclosure contained assemblies.
 - p. As-built wiring diagrams of overall system.
2. Updated system schematics and wiring diagrams shall be included as described in the Shop drawing and Submittal sections of this specification.
- a. Catalog data and complete parts list for all equipment and control devices.
 - b. Listing of recommended spare parts.
 - c. Listing of recommended maintenance tools and equipment.
3. Programmer Will Provide:
- a. Program documentation printout with tag numbers and descriptive comments.
 - b. Backup program on compact disk.

1.10 SHOP DRAWINGS

- A. The C. S. I. shall develop all shop drawings required for design, fabrication, assembly and installation of the control system. Shop drawings shall include all drawings required in manufacture of specialized components and for assembly and installation of them. Shop drawings shall be CAD drawn and include the following:
- 1. System schematic diagrams for the entire control system including but not limited to: all sensors, control panels, motor control center and motor control equipment; with all components and their locations indicated. Wire and terminal numbers shall be included on the schematic diagrams.
 - 2. Technical data sheets for all components with the complete part number of the component clearly designated with all required options.
 - 3. Arrangement drawings of all panel front- and internal-mounted instruments, switches, devices, and equipment indicated. Show all panel mounting details required. Include outer dimensions of all panels on the drawing. Deviations from approved arrangements require re-submittal and approval prior to installation.

4. Arrangement drawings shall be drawn to scale using standard Architectural or Engineering scales. See example drawings.
5. Detailed dimensional drawings of the installation of all sensors (level, pressure, flow, valve position, motion, etc.), actuators and of mounting brackets and other devices required for installation of sensors and actuators.
6. Shop drawings shall be provided on NON-FOLDED sheets no larger than 11 by 17 inches. Shop drawings shall include specific product detail such as rating, size, and number of contacts, etc. Wiring diagrams shall be included for all components in the system including control equipment supplied with mechanical devices.
 - a. The shop drawings shall be identified by the submittal number, revision number, and submittal date.
 - b. The MCC shop drawings shall be submitted concurrently with the Control System Integrator Drawings. Refer to specification 16443.
7. Wiring diagrams shall:
 - a. Be in format per example drawings at the end of this section.
 - b. Have a minimum of one sheet per each motor controller, or subsystem.
 - c. Have numbering by equipment to relate equipment shown on shop drawings to the bill of materials.
 - d. Include wiring diagrams for packaged control panels and other related control equipment supplied with mechanical systems.
 - e. Include instrument loop diagrams per LOOP example dwg.
 - f. Include for all motor control wiring diagrams, both the motor power and control wiring in the MCC bucket and other related control wiring for the motor on the same sheet. Per typical MOTOR CONTROL example dwg. At the end of this section.
 - g. Include details of individual PLC input and output cards with card wiring, base, slot, input, output, terminal, and device identification.
 - h. Provide individual PLC card information on an EXCEL spread sheet (on a "per card" basis, per example at the end of this section and provide one electronic copy on disk to the Engineer.
 - i. Provide wire and terminal numbering per the requirements in Section 16153.

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8. For shop drawing packages which include more than 10 sheets provide the drawings in a separate 11 by 17 inch binder with an index for the drawings at the front.
9. Installation details shall include the size, number, type and location of interconnecting wiring and conduit, installation of cabinets and enclosures, installation of sensors, instruments, limit switches, and other installation requirements. Shop drawings shall be submitted to the Electrical Contractor for review and approval. After approval by the Electrical Contractor, copies of all shop drawings shall be submitted to the Engineer.
10. Shop Drawing submittal shall contain submittal date and revision number on all shop drawing sheets.

1.11 CONTRACTOR REVIEW OF SUBMITTALS

- A. The Contractor and Electrical Contractor shall review all shop drawings prior to submittal to the Engineer. This review shall include:
 1. Coordination of wire routing on the wiring diagrams and the raceway system.
 2. Equipment shall be checked for layout and size for coordination and verification that equipment will fit within the space designated.
 3. Coordination for getting equipment into the structures.
 4. Coordinate with panel wire entrances and interior wireways and space (size and location) for field connections.
 5. Coordination of equipment mounting and installation.
 6. All submitted Shop Drawings shall be reviewed, signed and dated prior to Engineers review by;
 - a. General Contractor.
 - b. Electrical Contractor.
 - c. Control System Integrator.

1.12 WARRANTY

- A. As part of the guarantee required by these Specifications, the Electrical Contractor shall cause the C. S. I. to make any and all repairs, replacements, modifications and adjustments required to eliminate any and all defects in design, materials and workmanship for his work, which are disclosed within the one year guarantee period beginning at the date of substantial completion. The cost of the repairs for owner

supplied control panels are excluded from this warranty requirement. The C. S. I. shall begin all repairs, replacements, modifications and adjustments within twenty-four (24) hours of notification by telephone by the Owner and shall complete such repairs, replacements, modifications and adjustments within forty-eight (48) hours of notification. Should the C. S. I. fail to begin the work within 24 hours or complete the work within 48 hours, the Owner may proceed to undertake or complete the work. In such event, the Electrical Contractor and his surety shall be liable for all costs incurred by the Owner.

1.13 COORDINATION WITH MOTOR CONTROL AND OTHER EQUIPMENT

- A. The C. S. I. shall be solely and completely responsible for coordination and integration of control system with the motor control and other related equipment. The C. S. I. shall communicate directly with the manufacturer(s) and supplier(s) of all related control equipment to determine all intended details of the equipment which may influence or affect the control system.
- B. The C. S. I. shall determine all requirements for and shall cause integration of the control system and all other control equipment into a unified operating system. The C. S. I. shall define all requirements for all interfacing equipment and shall supply all appurtenances, accessories and all such devices which may be required for proper interfacing as part of the control system.
- C. The C. S. I. shall be responsible to obtain submittal information on equipment supplied by other disciplines and to integrate them into the control system to form a complete working package as outlined by the contract documents. This includes, but is not limited to, the following list of major pieces of equipment.
 - 1. Owner provided local control panels.
 - 2. Instrumentation.
 - 3. Packaged Equipment.
 - 4. HVAC Equipment.
- D. The C. S. I. shall provide reference connection diagrams in the submittal set of drawings for all associated equipment to the control system including but not limited to the following equipment:
 - 1. Owner provided local control panels.
 - 2. Instrumentation.
 - 3. Site and process network connection diagrams.
 - 4. HVAC Equipment.

1.14 QUALITY ASSURANCE

- A. Control Systems Integrator Qualifications:
 - 1. Description of ownership and organization of company.
 - 2. Resumes of principals and/or key employees.
 - 3. Description of expertise in design, assembly, testing and installation of control systems for municipal waterworks and sewerage facilities.
 - 4. Description of similar size municipal control systems designed, assembled and installed in the last five (5) years. Description shall include:
 - a. Names of employees involved in each system.
 - b. Detailed description and drawings of each system.
 - c. Cost of each system.
 - d. Names and telephone numbers of persons involved in operation and maintenance of each system.
- B. Description of the service capabilities normally provided by the company including resumes of employees assigned to field service and listing of service equipment.
- C. Description of spare parts normally stocked and of restocking procedures.
- D. Testing Agency Qualifications: Member Company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- E. Additional information that may assist the Owner in ascertaining the C. S. I.'s general ability to perform the work.
- F. Acceptability of the C. S. I. will be determined solely by the Owner.
- G. The Electrical Contractor, C. S. I., and the selected manufacturer shall anticipate that the Owner may withhold approval of the selected manufacturer if, in the opinion of the Owner, the manufacturer does not have the experience, capability or for performance and execution of similar projects in the past.
- H. The Electrical Contractor, C. S. I., and any manufacturer not approved by the Owner shall not be entitled to an extension of time or to any claim for damages because of extra and unanticipated costs, hindrances, delays or complications caused by or resulting from failure by the Owner to approve any manufacturer for whatever reason.

1.15 APPROVED CONTROL SYSTEM INTEGRATORS

- A. The Control System Integrator shall be selected by the Contractor from the following acceptable companies:
1. Technical Systems Inc.; Lynnwood, WA; 425-775-5696.
 2. Quality Controls, Inc.; Lynnwood, WA; 425-778-8280.
 3. QualiTEC; Liberty Lake, WA; 509-227-5686.
 4. Townsend Controls, Inc.; Pasco, WA; 509-524-9949.
 5. Blue Logix, LLC, WA; 509-888-4590
 6. Control Freek Inc, Spokane, WA 509-290-6500
- B. Other alternate System Integrators not listed above shall be considered for acceptability by the Owner based on the qualifications noted in 1.14 above and will be listed by addendum as necessary. Qualification shall be submitted to Engineer 10 days prior to the date to receive bids to be considered.

1.16 DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment to the job site at the appropriate time for installation. Equipment items shall be crated or affixed to pallets with protective wrappings. Exercise care to prevent damage from handling. Store mechanical and electrical components off the ground in weathertight enclosures. Keep equipment dry at all times.

PART 2 PRODUCTS

2.1 GENERAL

- A. Design and Assembly:
1. All equipment and materials utilized in the system shall be the products of reputable, experienced manufacturers with at least five (5) years experience in the manufacture of similar equipment. Similar items in the system shall be the products of the same manufacturer. All equipment shall be of industrial grade and of standard construction, shall be capable of long, reliable, trouble-free service, and shall be specifically intended for control and monitoring of operation of motor-driven pumps and equipment. All equipment shall be of modular design to facilitate interchangeability of parts and to assure ease of servicing. All equipment, where practical, shall be of solid state, integrated circuit design.

2. The system shall be completely assembled in the shop by the C. S. I. All components and equipment shall be prewired to the maximum extent possible.
3. All components, including both internally and face-mounted instruments and devices, shall be clearly identified with phenolic nameplates of white background with black letters.

B. Interconnecting Wiring and Terminals

1. The C. S. I. shall determine all requirements for field-installed interconnecting wiring between control system components, sensors, pumps and equipment. The C. S. I. shall determine the number, size, and type of wires and the number, size, type, and location of conduits and wireways.
2. The wire and conduit shown on the plans shall be considered only as general guidelines for signal and control circuits. The C. S. I. shall determine all specific requirements and shall confirm or modify the wiring and conduit shown on the plans to conform to such requirements.
3. All interconnecting wires installed by the manufacturer and installer shall be numbered at each end using custom pre-printed heat shrink sleeve markers. Markers shall be T&B, SHRINK-KON HVM or approved equal. Terminations shall be made using solderless pressure connectors at all terminations. All conductors shall be stranded wire with thermoplastic insulation and shall be cabled to groups and supported so as to prevent breaking and to present an orderly arrangement and neat appearance. All outgoing wiring shall be terminated on a marked terminal strip capable of connection of at least 2 No. 14 wires and all terminal connections shall be numbered consecutively throughout the system.
4. Provide 5 spare terminals in each enclosure that has terminals or 10 percent whichever is the greater amount. In addition, provide extra din rail with enough space for 20 percent more terminals.
5. For all energized circuits (power and control) powered from the panel and extend outside of the panel provide an individual fused terminal with appropriate fast blow fuse. Provide one fused terminal for each group of digital inputs associated with the control of a motor load.
6. (1/2 amp for PLC inputs) and "blown fuse" indicator light for each circuit.
7. For all signal circuits that extend outside of the panel provide an individual fused terminal with appropriate fusing and integral blown fuse indication. All 4 to 20 mA circuits shall be individually fused with a 1/16 amp fast blow fuse.
8. For all energized circuits powered outside of the panel which extend into the panel, provide a disconnecting terminal to isolate each individual circuit.

9. In general all control wiring shall be #14 AWG except PLC I/O wiring between the PLC cards and the terminal strips within the same cabinet shall be #18 AWG.
10. Provide wire ways as necessary in the enclosure to contain all internal wiring and all field wiring. Size wireways such that there is ample room for the wiring required by this contract. Wireways shall be filled to a maximum of 70 percent to allow 30 percent more future wire.
11. Low voltage DC control and signal conductors shall be bundled separately from alternating current circuits. Separate raceways and wire gutters shall be dedicated for AC and DC wiring, and labeled as such on the shop drawings. Wiring may cross at right angles if necessary. Special caution shall be used for PLC I/O card wiring and field terminations to accommodate the separation of AC and DC circuits. Intrinsically safe wiring shall be physically separated from non-intrinsically safe wiring.
12. All wiring shall be neatly tied in position with nylon cable ties. Instruments with portable cord connections shall be fed through the instrument panel plug strip which shall be located near the top of the panel directly above the instruments. Instrument supply cords shall be the only panel wiring which is not continuously supported and tied.
13. All wiring and tubing crossing hinges shall be installed in a manner to prevent chafing. Bundles of similar conductors shall be clamped securely to the door and to the panel, and the bundles shall run parallel to the hinge for at least 12 inches. Spiral nylon cable wrap shall be provided in the hinge section of the bundle to fully protect the conductors or tubing against chafing.

2.2 PROGRAMMABLE CONTROL EQUIPMENT

- A. Accept and modify Owner provided local control panel.
- B. Programming of Programmable Controllers:
 1. Programming of the programmable controller (PLC) shall be by Blue Logix, LLC, WA; 509-888-4590

2.3 OPERATOR INTERFACE TOUCH SCREEN

- A. Provide and install a touchscreen in each of the Owner provided local control panels.
 1. Allen Bradley color Panelview Plus 7" professional edition.
 - a. Provide all required hardware.

2.4 EQUIPMENT ENCLOSURES

- A. Sizes of enclosures shown on the drawings are minimum. C. S. I. shall upsize the enclosures for the installed components as necessary if approved by the Engineer and the larger enclosure will fit within the space dedicated to the enclosure.
- B. Control Cabinets:
 - 1. Control cabinets shall be manufactured by Hoffman Products, Inc. or approved equal.
 - 2. Control cabinets installed in indoors in dry areas, non-corrosive areas shall be NEMA 12, steel construction.
 - 3. Control cabinets installed in damp or corrosive or outdoor areas shall be NEMA 4X, stainless steel construction.
 - a. The latching mechanism for all control cabinets shall be a 3-point type with a stainless steel handle. For enclosures that are too small for 3-point, a maximum of 2 (two) quarter turn (screw driver or hand operated) latches shall be used.
 - b. All outdoor cabinets shall be provided with pad lockable hasps.
 - 4. Control cabinets shall be hinged with stainless steel pins.
 - 5. Provide all control cabinets with a data pocket and insert the cabinet drawings in the pocket when shipped to the site.
 - 6. Provide corrosion inhibitors in all control cabinets prior to shipping. Amount of inhibitor shall be provided for the volume of the enclosure for one year.
- C. Enclosures, Boxes and Hand Stations:
 - 1. All terminal, pull, and junction boxes and control stations shall be:
 - a. Manufactured by Hoffman, Inc. or approved equal.
 - b. Installed indoor in dry areas shall be NEMA 12 steel.
 - c. Installed in damp, or corrosive or outdoor areas shall be NEMA 4X non-metallic or stainless steel construction with:
 - 1) Screws, bolts, and other hardware shall be stainless steel.
 - 2) The hinges shall have stainless steel pins.

- d. All enclosures with covers more than 1 square foot total area shall be hinged when available.

D. Enclosures, Boxes and Hand Stations (Hazardous Areas):

1. Enclosures, boxes and hand stations in hazardous areas shall be model GUA, GUB or GUE, as manufactured by Crouse Hinds, or approved equal.
2. In dry, indoor, or non-corrosive areas they shall be rated for the area installed.
3. In damp, outdoor, or corrosive environments, provide with corrosion resistant materials, Stainless steel hinges, screws, bolts, and other hardware, and neoprene gaskets.

E. Enclosure Door Latches:

1. Door latches shall be fast operating type 3-point latch door handle; or where a 3-point latch will not meet rating requirements use fast operating clamp assemblies. Hoffman Bulletin A-80. The latch handle shall operate toward the center of the panel to open the door, and be pointing down when closed. All enclosures shall have a maximum of (2) two latches. Enclosures with more than 2 latches are not acceptable.
2. Small boxes and control stations shall have 2 screw driver or hand operated latches.
3. All outdoor cabinets shall be provided with pad lockable hasps.

F. Wireways:

1. Provide molded plastic wireways, slotted for wire connections for all wiring in the panels. They shall be complete with covers. Wireways shall be as manufactured by Panduit, Taylor, or approved equal.

G. Terminals:

1. Provide terminals for all wire connections to field wiring and internal power distribution. Analog loops that are 24 VDC powered shall have a knife switch to disable the loop if necessary. Connections shall have box type lugs capable of terminating 2 #14 AWG stranded wires. Terminals shall be strip mounted as manufactured by Phoenix Contact or equal.
2. Provide terminals on a 1-1/2 inch raised track in control cabinets. Track shall be aluminum and bonded to the cabinet.
3. Fuse terminal blocks shall be hinged disconnect level type with "blown fuse" indicators. PHOENIX CONTACT UK 5 series or equal.

4. Disconnecting terminal blocks shall be knife type with light indicator PHOENIX CONTACT type MTK or equal.
5. Provide 1 spare, or 3 percent whichever is the greater amount, spare (non installed) replacement terminals for each type used.

H. Fuses:

1. Fuses shall be of the type and amperage indicated on the drawings. The voltage rating shall be appropriate for the application indicated. The fuse types indicated on the drawings imply a certain set of fuse characteristics. No substitutions of fuse types will be allowed without written approval from the Engineer.
2. Provide blown fuse indicators on all fuses.

2.5 RELAYS

A. Relays for General Purpose:

1. Relays for general purpose use shall have 10 Amp contacts with the appropriate coil voltage for the application. All relays shall have an integral indicating light to show if there is coil voltage present. They shall have an 8-pin/blade base and matching socket. Appropriate relay shall be selected based on application from the control wiring diagrams.
2. Units shall be Allen-Bradley 700 type HA, HB, IDEC RH Series, or approved equal.

B. Time Delay Relays:

1. Time delay relays shall be multi-function, multi-range with plug-in base, pin style terminations timing and timed out LED indicators, and calibrated scales. Relays shall have minimum 0.5 seconds to 60 minutes, 8 selectable timing ranges, and 5 amp contacts. Select coil voltage for the application. Minimum accuracy requirements (plus or minus) shall be as follows: 1) Repeat accuracy 1/2 percent 2) Timing change over full voltage range 1/2 percent change over full temperature range 2 percent 3) Scale tolerance 5 percent. Appropriate relay shall be selected based on application from the control wiring diagrams.
2. Units shall be Allen-Bradley Bulletin 700 type HR series; IDEC, GT3A, or approved equal.

2.6 CONTROL DEVICES AND INSTRUMENTATION

- A. Reference Specification 16906 "Process Instrumentation Meters and Transmitters" for additional information.

2.7 FIBER OPTIC PATCH PANEL:

- A. Suitable for patching, cross connect and/or splicing of single mode or multimode fibers.
- B. Metal enclosure.
- C. 16 ST or FC connections minimum.
- D. Manufacturer and model number: Leviton, Opt-X with adapter plates or approved equal.
- E. Provide NEMA 12, 18"Hx12"Wx8"D "fiber Optic Junction box" located below LCP-IHB.
 - 1. Install patch panel and communications modem in fiber Optic Junction box.
 - 2. Locate modem power source in LCP-IHB.

2.8 SPARE PARTS

- A. Spare parts shall be shipped with the control panels in a separate container, with a Bill of Materials, and specifically marked "SPARE PARTS".

PART 3 EXECUTION

3.1 FACTORY ACCEPTANCE TESTING

- A. Factory Acceptance Testing of Control System:
 - 1. The C. S. I. shall perform operational testing of the control system in their shop. Testing shall be conducted in two phases. Connections (copper, fiber optic, RF, or other media) required to provide communication between control panels and other system components shall be provided by the C.S.I.
 - 2. The initial testing of the control system shall include configuration of the Owner provided PLC (LCP) and its communications equipment, energizing each digital input and output and simulating each analog input and output using a loop simulator and calibrator. Circuits not energized shall be tested for continuity. Energized circuits shall be tested through all components from the terminal blocks in the control panel to the hardware I/O memory locations in the PLC. Initial testing of the control system shall be considered completed only after the control system has operated continuously, 24 hours per day, for at least one week.
 - 3. The C. S. I. shall provide an I/O checklist for all points in the control panel. The list shall include for each point, the tag name of the points, a description of the point, comments, date and time of the test, and a signature line for the person performing the test. Show that each digital point was set and reset. Show

verification of all Analog points at 0 percent, 25 percent, 50 percent, and 100 percent of range.

4. After completion of initial testing, the C. S. I. shall conduct subsequent testing for inspection by the Engineer. All control functions and all status and alarm monitoring and indication shall be demonstrated under simulated operating conditions. Simulating equipment shall be provided and wired into the control system for this testing. The C. S. I. shall revise, modify, and adjust the system as required by the Engineer during the testing period. Testing shall be continued for the time period required by the Engineer to observe and verify any revisions.
5. The C. S. I. shall ensure that all hardware and software to perform the test are available prior to commencement of the test. This includes test cables, Simulators, Volt-Ohm meters, communications cables, etc.
6. The C. S. I. shall notify the Engineer in writing at least 30 days prior to expected initiation of the inspection and testing by the Engineer.
7. Testing and inspection shall include all control components, motor control centers, control panels, and shall take place at the Integrators shop. Motor control centers, control panels and other control components shall not be shipped to the site until inspection and testing is complete to the satisfaction of the Engineer and the C.S.I. has received written authorization from the Engineer.
8. The presence of the Engineer during testing does not relieve the C.S.I. from conforming to the requirements of the Contract Documents and shall in no way imply acceptance of the equipment.

B. Software Coordination for Control System:

1. After completion of initial testing, the C.S.I. shall provide for time, equipment, and support in their shop for the Software Programmer (Blue Logix, LLC and City I.S Department) to load and test the program in the control system for a period of up to 5 working days. All control functions and all status and alarm monitoring and indication shall be demonstrated under simulated operating conditions. Simulating equipment shall be provided and wired into the control system for this testing. The C.S.I. shall revise, modify, and adjust the system as required by the Engineer during the Coordination period. Coordination shall be continued for the time period required by the Engineer to observe and verify any revisions.

3.2 FIELD TESTING

- A. The C. S. I. and Electrical Contractor shall perform operational testing of the control system in the field. Testing shall be conducted in two phases. The initial testing shall

include, but not be limited to, operation of all input and output (I/O) points, control devices and motor controls.

- B. The initial testing of the control system shall include configuration of the PLC and its communications equipment, energizing each digital input and output and simulating each analog input and output using a loop simulator and calibrator. The I/O shall be tested in conjunction with the Electrical Contractor who is installing the instrumentation and control wiring. Circuits not energized shall be tested for continuity. Energized circuits shall be tested through all components from the field instrument to the hardware I/O memory locations in the PLC. If a point cannot be verified within 5 minutes of starting the check that point shall be noted as a punch list item to be corrected and re-tested at a later time.
- C. The C. S. I. shall provide an I/O checklist for all points in the control panel. The list shall include for each point, the tag name of the points, a description of the point, comments, date and time of the test, and a signature line for the person performing the test. Show that each Digital point was set and reset. Show verification of all Analog points at 0 percent, 25 percent, 50 percent, and 100 percent of range. The Checklist shall be submitted to the Engineer 1 week prior to the startup of the control system. The C. S. I. and the Electrical Contractor shall both be present for the verification of the I/O system by the Engineer.
- D. The C. S. I. shall ensure that control panels have been installed correctly and tested 1 week prior to the commencement of the system startup. Startup testing shall not begin until the panel installation has been completed and verified by the Engineer.

3.3 INSTALLATION

- A. The control system panels and motor control center equipment shall not be shipped to the site until a suitable environment is available for installation of the equipment. A suitable environment for the purposes of this contract for the control panels and motor control center shall be dry, covered and heated to maintain a minimum ambient temperature of 60 degrees f. Prior to shipment of electrical equipment, the Electrical Contractor shall contact the Engineer for field verification of a suitable environment.
- B. The control system shall be installed in accordance with the installation drawings and instructions prepared by the C. S. I. Installation shall be performed by workers who are skilled and experienced in the installation of electrical instrumentation and control systems.
- C. Installation shall include all elements and components of control system and all conduit and interconnecting wiring between all elements, components, sensors and valve operators. All wiring between cabinets, sensors, pumps and equipment shall be multiple color coded for ease of servicing. All terminations shall be made with solderless pressure connectors. All wiring shall be in accordance with the requirements of Sections 16119

and 16123. Intrinsically safe wiring shall be separated with barriers per NEC requirements.

- D. Install a copy of the O&M wiring diagram for each controlled load in the associated drawing pocket of each MCC bucket.

3.4 CALIBRATION AND START-UP

- A. All components of the control system shall be calibrated by the C. S. I. after completion of installation. Each component shall be adjusted to be within the manufacturer's required range and for the specific application.
- B. Components that cannot be properly calibrated or that are found to exceed the manufacturer's specified range or accuracy shall be removed and replaced at no additional cost to the Owner.
- C. The control system shall be placed into operation by the C. S. I.
- D. All components shall be recorded on loop check-off forms and shall be witnessed tested by the Owner or representative.

3.5 SYSTEM VALIDATION

- A. When the installation is ready for validation testing (as determined by Engineer), the Contractor shall commence integration testing of the control system. This shall determine that all system components connect up correctly to each other so that the system works as designed.
- B. The C. S. I. shall calibrate all instruments, indicators, recorders, loops, etc. and fill out appropriate test forms provided at the end of this section. Test forms shall be received by the Engineer prior to validation testing.
- C. After the integration testing is complete, validation testing shall be by the C. S. I. and Contractor, with the Owner and Engineer present. Validation testing shall include operation and verification of all control components and features of the entire control system. The Contractor shall inform the Engineer of the testing schedule at least one week prior to the commencement of testing. Validation testing shall be considered complete when the Owner and Engineer have determined that all of the original system requirements have been met.
- D. The Contractor shall revise, modify, adjust and reprogram the system as required during and following start-up to provide the operation required by the Engineer.
- E. Note: The Engineer shall not be called out by the Contractor for validation testing on equipment until all components are installed, all wiring points have been checked, and operation has been tested and verified by the Contractor.

3.6 SYSTEM MAINTENANCE

- A. The C.S.I. shall be solely and completely responsible for all maintenance of the hardware system from time of start-up to the date of acceptance, by formal action of the Owner, of all work under the contract. The C. S. I. shall correct all deficiencies and defects and make any and all repairs, replacements, modifications, and adjustments as malfunctions or failures occur. The C. S. I. shall perform all such work required or considered to be required by the Owner to cause and maintain proper operation of the system and to properly maintain the system.
- B. The Contractor and the C. S. I. shall anticipate that the Owner may delay acceptance of all work under the contract if, in the judgment of the Owner, malfunctions or failures in operation of the control system repeatedly occur after start-up. Both the Contractor and the Integrator shall not be entitled to an extension of time or to any claim for damages because of hindrances, delays or complications caused by or resulting from delay of the work because of malfunctions or failures in operation of the control system.

3.7 OPERATION AND MAINTENANCE TRAINING

- A. The C. S. I. shall conduct specifically organized training sessions in operation and maintenance of the control system for personnel employed by the Owner. The training sessions shall be conducted to educate and train the personnel in maintenance and operation of all components of the control system. Training shall include, but not be limited to, the following:
 - 1. Preventative maintenance procedures.
 - 2. Trouble-shooting.
 - 3. Calibration.
 - 4. Testing.
 - 5. Replacement of components.
 - 6. Automatic mode operation.
 - 7. Manual mode operation.
- B. At least 2 separate training sessions, each at least 4 hours in duration, shall be conducted at the facility after start-up of the system. The C. S. I. shall prepare and assemble specific instruction materials for each training session and shall supply such materials to the Owner at least (2) weeks prior to the time of the training.
- C. The C.S.I shall submit to the Engineer and the Owner with copies of the instruction Materials, signed by all Owner's personnel that received instruction.

3.8 OPERATING DEVICE LOCATION:

- A. Operating devices shall be mounted no higher than 6'-4" and no lower than 4'-0" above finished floor when panel is installed unless otherwise approved by the Engineer. Operating devices with displays (such as PLC interface and power monitoring devices) shall be mounted so that the display is between 5'-3" and 5'-8" above finished floor unless otherwise approved by the Engineer.

3.9 MECHANICAL INTERFACE REQUIREMENTS:

- A. Provide a pressure gauge (if not already provided) to measure the same system pressure for pressure switches and transmitters.
- B. Provide an in-line isolation valve for each pressure gauge, transmitter and switch.
- C. Provide a test TEE with a plug in the pipe between the isolation valve and the pressure switch or transmitter.
- D. Provide factory glycol (or equal) filled isolation switches and transmitters with isolation diaphragms when measuring pressures of corrosive materials or for any lines not conveying potable water.

END OF SECTION

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APPENDIX 'A'

- *City of Moscow Standard Construction Specifications
and Standard Construction Drawings*

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PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION

STANDARD CONSTRUCTION SPECIFICATIONS

Modified for the City of Moscow Booster Sites - Phase II Project

Construction Standards – All work shall be completed in according to the project drawings and specifications. The project specifications supplement the City of Moscow Standard Construction Specifications and Drawings. In case of conflict, the most stringent requirement applies.

Idaho Standard Public Works Construction (ISPWC) Specifications and Details also apply where specifications or details are not provided in the project drawings and specifications or the City of Moscow Standards.

CITY ENGINEER:

Scott Bontrager, P.E.

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ENGINEERING SPECIFICATIONS

ES-1. SCOPE OF WORK

The scope of work for the project is as set forth in the project specific plans and specifications.

The intent of the contract is to provide for the construction and completion in every detail of the work described.

The City reserves the right to make, at any time during the progress of the work, such changes in quantities and such alterations in the scope of work as are necessary to satisfactorily complete the project and the Contractor shall perform the work as altered. Compensation for change in scope of work will be in accordance with the project specific contract documents.

Unless otherwise noted, all labor, materials, and equipment necessary for the execution and completion of the work shall be furnished by the Contractor.

ES-2. TRAFFIC CONTROL/R.O.W USE PERMITS

2.1 Traffic Control

- A. The Contractor shall obey all rules, laws, ordinances and regulations of all traffic regulatory authorities having jurisdiction regarding the closing or barricading of public streets. Work shall not begin until the proper permits have been acquired and all required traffic control devices are in place.
- B. **Prior to commencement of work, the Contractor shall submit to the Engineer for review, Traffic Control Plan(s) created by an *ATSSA or ESC certified Traffic Control Supervisor*. The plan shall be consistent with requirements detailed in the current edition of the Manual on Uniform Traffic Control Devices (MUTCD) and shall include identification of detour routes for pedestrians. All traffic control devices shall be MUTCD approved, and installed and maintained by *ATSSA or ESC certified Traffic Control Technicians*. In the event where flagging is required to control traffic flow around a work zone, all flaggers shall have a *current ATSSA or ESC flagging card*.**

Traffic control plans for work within State of Idaho highway right-of-way must also be approved by the Idaho Transportation Department.

- C. The work shall be carried out so as to cause a minimum of dislocation of normal commercial pursuits. Traffic must be kept open on roads and/or streets where no detour is possible. The Contractor shall, in addition to other requirements contained herein, without further notification or other order, provide, erect, and maintain at all times during the progress or temporary suspension of the work,

barricades, fences, signs, flaggers, or other protection in accordance with the most current edition of the "Manual on Uniform Traffic Control Devices" and shall provide, keep, and maintain such danger lights, signals, and flaggers, as may be necessary or ordered by the Engineer and/or traffic regulatory authorities having jurisdiction to ensure the safety of the public as well as those engaged in connection with the work. All barricades and obstructions shall be protected by signal lights which shall be suitably distributed across and along the roadway and which shall be kept burning from one hour before sunset until one hour after sunrise and at other times as vision is obscured by fog, smoke, or dust.

- D. The Contractor shall promptly reopen streets and driveways to the public after construction work requiring their closure is completed, and all safety issues have been resolved. Local traffic shall be provided access to private properties at all times, except during necessary stages of construction when it is impractical to carry on the construction and maintain traffic simultaneously, such as for the placing of hot mix asphalt pavement, placing and curing of Portland cement pavement, and deep sewer excavation which prohibits safe travel of vehicular traffic. No private driveway may be closed except as provided here-in, or unless permission is given the Contractor by the owner of the property affected. Emergency traffic such as police, fire, and disaster units shall be provided reasonable access at all times. The Contractor shall be solely responsible for any damages which may result from failure to provide such reasonable access.
- E. The Contractor shall take every precaution to protect pedestrian, bicycle and vehicular traffic. Whenever, in the opinion of the Engineer, the Contractor has not provided sufficient or proper safety precautions and safeguards, he/she shall do so immediately, and to whatever extent the Engineer directs at no additional cost to the City. Should the City Engineer deem it necessary to augment the traffic control devices and the Contractor be unresponsive or unwilling to do so, the Contractor will be charged the customary rental rate and force account charges for the required personnel to bring the site into compliance with the MUTCD.

2.2 Right of Way Use Permits

- A. All street and sidewalk closures require a City issued Street Closure Permit.
- B. Work within public right of way requires a City issued Right of Way use permit.
- C. Work within State of Idaho highway right-of-way requires an Idaho Transportation Department (ITD) permit. These permits must be obtained through the City; not directly from ITD.

2.3 Payment: Traffic Control

Payment shall be as described in SECTION 01025

~~Traffic control will be paid for as incidental to other bid items if there is no specific bid item for traffic control included in the proposal; OR, as a lump sum amount if traffic control is included~~

as a separate pay item in the proposal. Lump Sum price for traffic control includes furnishing, installing and maintaining the required devices to comply with MUTCD requirements.

ES-3. MATERIALS

All materials shall be new, free of defects, manufactured in the USA, and shall be furnished and installed according to the manufacturer's specifications.

ES-4. REMOVALS AND DISPOSALS

The Contractor shall be responsible for all removals indicated on the Plans and in the Specifications, and as may be necessary to complete the work in accordance with the true intent and meaning of the drawings and the details.

The Contractor shall patch, repair, and/or replace all existing work immediately adjacent to the newly constructed areas, or where removals are made, so that such adjacent work is left in the same state as their original condition. Such applications specifically shall apply to private driveways with the intent that all such driveways will be left with a smooth consistent and constant grade constructed of the same material and to the same specifications as originally used in constructing the driveway.

When salvageable material is to remain Contracting Agency property, the Specifications will identify the material and describe how the Contractor shall remove it and where it will be stored. Any material not named in the Specifications as Contracting Agency property will become the property of the Contractor and shall be removed from the project.

The Contractor may dispose of waste material in Contracting Agency-owned sites if the Specifications or the Engineer permits it. Otherwise, the Contractor shall arrange to dispose of waste at no expense to the Contracting Agency.

The Contractor shall acquire all permits and approvals required for the use of the disposal site. The cost of any such permits and approvals shall be included in the Bid prices for other Work.

The Contractor shall provide the Engineer the location of all disposal sites to be used and also provide copies of the permits and approvals for such disposal sites before any waste is hauled off the project.

The Contractor shall protect, indemnify, and save harmless the Contracting Agency from any damages that may arise from the Contractor's activities in making these arrangements. Any action required to satisfy any permit and/or any approval requirements in a Contractor-provided disposal site shall be performed by the Contractor at no additional expense to the Contracting Agency.

Removals and disposals will be paid by lump sum or unit price:

The price shall include all costs incurred to remove and dispose of the items bid including labor and equipment and other incidental costs.

ES-5. EARTHWORK

5.1 Excavation

All excavation shall be unclassified, except that which is required for the installation of pipe (storm, sanitary, water, drain), which is classified as trench excavation.

This work shall consist of excavation and disposal of all material, not being removed under some other item, which is encountered within the limits of the work necessary for the construction in accordance with the Specifications and in reasonable close conformity with the lines, grades, or thicknesses shown on the plans, or established by the Engineer.

This work shall include all excavation performed under this item regardless of the material encountered.

This work shall include the removal and disposal of any structure or any miscellaneous obstructions which are visible or are indicated on the plans which encroach upon or otherwise obstruct the work and for which a separate bid is not taken.

This work shall also include the preparation of the subgrade when the subgrade is not on a fill section. Subgrade elevation shall be below the gravel base elevation of pavement as indicated on the plans, and shall conform to the crown of the finished pavement surface. All depressions or ruts containing water shall be drained, as arranged with the Engineer. The entire surface shall be bladed to remove inequalities and secure a uniform surface. Line and grade stakes will be provided once by the Engineer, or his/her representative. The Engineer, or his/her representative, will set one set of stakes at fifty (50) foot intervals and at closer intervals where necessary. The subgrade shall be brought to a firm unyielding surface, true to line, grade, and cross section, by rolling and processing with equipment generally used for this purpose and acceptable to the Engineer. All soft, spongy, or yielding spots, which may be ordered to be removed by the Engineer, shall be entirely removed and replaced with geotextile and suitable rock material and thoroughly compacted to the satisfaction of the Engineer.

5.2 Structural Fill

This work shall consist of furnishing and placing selected material in one or more courses to form a stable roadbed in accordance with these specifications and in conformity with the Plans.

Structural fill (also 'Borrow' or 'Embankment') may consist of naturally occurring sand, sand gravel, sand and rock mixtures, decomposed granites, and native loess or clays. Sand and rock mixtures shall contain sufficient sand to fill the voids of the larger gravel

and stone to permit the required compaction. All borrow must be obtained from designated or approved sources. Structural fill shall be free of roots, bark, topsoils or other organic materials.

The surface upon which the structural fill is to be placed shall conform to the established lines and grades and shall be smooth and uniform, having been cleared of all vegetation, roots, stumps, topsoil, and foreign material.

The Contractor shall use necessary precautions in loading borrow to assure reasonable uniformity in grading.

Borrow shall be compacted with modern, efficient, compacting equipment satisfactory to the Engineer.

Embankment shall be placed in successive horizontal layers not exceeding eight (8) inches in loose thickness. All embankment shall be compacted to at least ninety-five (95) percent of the maximum density in accordance with AASHTO T-99. At all locations that are inaccessible to a roller, the embankment shall be brought up in horizontal layers and compacted thoroughly with mechanical tampers. The horizontal layers shall not exceed eight (8) inches in loose thickness. The compacting equipment may be of any type provided they are capable of compacting each lift of the material to the specified density.

5.3 Payment

Payment shall be as described in Section 01025

The accepted quantities of EXCAVATION will be paid for by the per cubic yard unit price or by lump sum. The quantity of excavation, as listed on the proposal or measured in the field, shall be used to compute the final payment, exclusive of any extra work ordered by the Owner or his/her representatives, as provided under Section GC-11, Extra Work.

The accepted quantities of STRUCTURAL FILL will be paid for by per cubic yard unit price or by lump sum. The unit price per cubic yard shall include all materials, labor, equipment and other costs incidental to furnishing and placing the borrow as herein specified and as shown on the plans.

ES-6. SUBGRADE SEPARATION GEOTEXTILES

6.1 Materials

Geotextile shall be Type II, nonwoven or woven, as set forth in **Section 718.07 – Subgrade Separation Geotextile Property Requirements** of the latest edition of the Idaho Transportation Department's Standard Specifications for Highway Construction.

6.2 Construction Requirements

Geotextile shall be furnished and installed in accordance with **Section 640 – Construction Geotextiles** of the latest edition of the Idaho Transportation Department's Standard Specifications for Highway Construction.

6.3 Payment

Payment shall be as described in Section 01025

Geotextile will be paid for on the basis of unit price, per square yard, furnished and installed.

ES-7. CRUSHED ROCK BASE

7.1 Description

This work shall consist of furnishing and placing one or more courses of aggregate on a prepared surface in accordance with these Specifications and in reasonable close conformity with the lines, grades, thicknesses and typical sections shown on the Plans and/or established by the Engineer.

The Contractor shall make their own arrangements for obtaining crushed rock base material and shall designate the source of same in ample time to permit sampling and testing by the Engineer.

7.2 Aggregate

A. 3/4" (-) Aggregate shall conform to the following gradation:

Sieve Size	Percent Passing
1 inch	100
3/4 inch	90 – 100
No. 4	40 – 65
No. 8	30 – 50
No. 200	3 – 9

The sand equivalent shall not be less than 30 if 5 percent or more of the material passes the No. 200 sieve. Sand equivalent will not be required if less than 5 percent passes the No. 200 sieve.

B. 1-1/4" (-) Aggregate shall conform to the following gradation:

Sieve Size	Percent Passing
1-1/2 inch	100
1 inch	90 – 100
1/2 inch	60 – 80
No. 4	35 – 60
No. 8	25 – 50

No. 30	10 – 30
No. 200	2 – 9

The sand equivalent shall not be less than 30 if 5 percent or more of the material passes the No. 200 sieve. Sand equivalent will not be required if less than 5 percent passes the No. 200 sieve.

7.3 Test Methods

Tests shall be made in accordance with the following applicable standard methods:

Field determination of density of soil in-place and percent compaction.	Idaho T-74
Compaction standard for coarse granular materials by use of the vibratory spring-loaded compactor.	Idaho T-74
Moisture density relations using a 5.5 lb. rammer and 18 inch drop, method A or C.	AASHTO T-99
Nuclear method for the determination of percent compaction in place density and moisture content of soils and aggregates.	WAQTC TM7

7.4 Placing

Prior to placing base rock, the excavated subgrade will be graded smooth and compacted to the satisfaction of the Engineer. Geotextile fabric shall then be placed upon the full width of the compacted subgrade. The geotextile fabric shall be as specified in Specification ES-6 SUBGRADE SEPARATION GEOTEXTILES. Joints between sections of fabric shall overlap a minimum of 2 feet along longitudinal joints and a minimum of 6 feet at end joints.

If the required compacted depth of the base course exceeds 8.0 inches, the base shall be constructed in two or more layers of approximate equal thickness.

7.5 Mixing

Unless otherwise specified, the Contractor shall mix the base course by any one or a combination of the three methods specified below:

Stationary Plant Method. The aggregate and water shall be mixed in an approved mixer. Water shall be added during the mixing operation in an amount necessary to facilitate compaction. After mixing, the base material shall be placed on the roadbed by means of an approved aggregate spreader.

Travel Plant Method. After the material for each layer of base course has been placed through an aggregate spreader or windrow sizing device, the base shall be uniformly mixed by a traveling mixing plant. During the mixing, water shall be added in an amount necessary to facilitate compacting.

Road Mix Method. After material for each layer of base course has been placed, the materials shall be mixed by motor graders or other approved equipment until the mixture is uniform throughout. During the mixing, water shall be added in an amount necessary to facilitate compaction.

7.6 Shaping and Compaction

After each layer has been spread it shall be compacted for its full width. The choice of compaction equipment will be left to the Contractor. Compaction shall continue until not less than 95% of the standard density is attained as determined by AASHTO T-99.

At the request of the Contractor, the Engineer, or his/her representative, will set one set of stakes at fifty (50) foot intervals and at closer intervals where necessary.

All soft, spongy, or yielding spots, which may be ordered repaired by the Engineer, shall be repaired in accordance with Specification ES-8 SOFT SPOT REPAIR.

7.7 Payment

Payment shall be as described in Section 01025

The accepted quantities of CRUSHED ROCK BASE will be paid for by the unit price per ton. The unit price per ton shall include all materials, labor, equipment and other costs incidental to furnishing and placing the crushed rock, as herein specified and as shown on the plans.

Weight slips, in duplicate form, shall accompany each load of crushed rock to the construction site. Upon delivery of the material, one copy of the weight slip will be given to the Engineer, or his/her representative, and one copy will remain with the truck driver, before the material is unloaded. Under no conditions will any weight slips be accepted by the Engineer, or his/her representative, after the material is unloaded from the vehicle. It shall be the responsibility of the Contractor to give the Engineer ample advance notice of the time when such material shall arrive at the job site, in order to assure the presence of the Engineer, or his/her representative, at the job site during delivery of the material. The weight slips will be the only basis of determination of pay quantity for this item.

ES-8. SOFT SPOT REPAIR

8.1 Materials

Geotextile shall be Type II, nonwoven or woven as per Specification ES-6 SUBGRADE SEPARATION GEOTEXTILES. Crushed Rock Base shall be 1-1/4"(-) crushed basalt per Specification ES-7 CRUSHED ROCK BASE.

8.2 Construction Requirements

All soft spots in the subgrade shall be called to the attention of the Inspector prior to placing the geotextile fabric. The Inspector shall determine where additional excavation is necessary and instruct the Contractor on such over excavation.

All soft, spongy, pumping or yielding areas will be ordered by Engineer to be repaired as herein described:

1. Remove subgrade to a depth of one foot below design subgrade elevation.
2. Add Subgrade Separation Geotextile to the bottom of the excavated area. This layer of geotextile will be in addition to that required for the entire subgrade area.
3. Backfill the area with Crushed Rock Base (95% min. compaction) to subgrade design elevation.

Dispose of the excavated material per Specification ES-4 REMOVALS AND DISPOSALS.

The Contractor shall cooperate with the City in determining the areas that require Soft Spot Repair by furnishing a loaded dump truck and operator to roll over the entire subgrade area and, with the assistance of a City representative, locate and mark all soft spots.

8.3 Payment

Payment shall be as described in Section 01025

~~SOFT SPOT REPAIR will be paid for on the basis of unit price, per square yard, complete, in-place; including excavation, base aggregate and geotextile.~~

~~The Engineer may determine that excavation in excess of the one foot depth may be required to accomplish the repair; in such instances compensation will be adjusted proportionately.~~

ES-9. WATERING

Bulk water furnished to contractors for the construction of City funded projects will be provided at NO cost to the contractor. Bulk water furnished to contractors for purposes other than the construction of City funded projects must be purchased from the City. All bulk water use by

contractors will be metered and paid for under rates and fees established by the City's most current adopted fee schedule and pursuant to City Code.

ALL BULK WATER WILL BE FURNISHED IN ACCORDANCE WITH THE CITY OF MOSCOW'S 'BULK WATER USE POLICY'.

Contractors shall coordinate ALL water usage with the Moscow Water Department.

ES-10. WEIGHING

Weighing equipment for the weighing of crushed stone surfacing materials, bituminous construction, etc., shall consist of and conform to Section 109, of the latest edition, of the Idaho Transportation Departments Standard Specifications for Highway Construction, and amendments thereto. In any event, the scales shall be tested and sealed, at the expense of the Contractor, as set forth in the Standard Specifications listed above. Weight slips in duplicate form shall accompany each load of crushed rock or asphalt to the construction site.

ES-11. CONCRETE

11.1 General

Portland cement concrete shall conform to Section 502 of the latest edition of the Idaho Transportation Department Standard Specifications for Highway Construction, and amendments thereto, and as follows:

Portland cement concrete shall be composed of Portland cement, fine aggregate, coarse aggregate and water, proportioned and mixed in accordance with these specifications. Unless otherwise provided, the Portland cement concrete shall be Idaho Transportation Department Class 40B having a minimum unit compressive strength at 28 days age of 4,000 psi. Class 40B concrete shall have 6 sacks of cement per cubic yard of concrete and an air entrainment content of 6.5 percent, plus or minus 1.5 percent. The slump shall be a maximum of five (5) inches and shall not vary more than one (1) inch from the average

11.2 Portland Cement

Class 4,000 concrete shall be used for curb and gutter, sidewalk, approaches, driveways, and pedestrian ramps. Type III Portland Cement shall be used in concrete placed for all driveways, approaches, and curb and gutter unless otherwise approved by the Engineer.

Portland cement shall conform to AASHTO M-85, Type I or II and shall contain no more than 0.60 percent total alkali. Type III can be used with prior approval of the Engineer.

Unless otherwise permitted, the product of only one mill or any one brand and type of Portland cement shall be used on any single pour.

11.3 Aggregates

Aggregates shall be reasonably free from wood, roots, bark, soft or disintegrated pieces, or other deleterious matter. Blend sand may be approved for use to correct deficiencies in the grading

sizes, provided the combination meets the specification requirements for the class of material being produced.

Fine aggregate for concrete shall conform to the following gradation:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/8 inch	100
No. 4	95 – 100
No. 16	45 – 80
No. 50	10 – 30
No. 100	2 – 10
No. 200	0 – 4

Sand equivalent shall be a minimum of 70.

Fineness modulus to be between 2.50 and 3.10 (AASHTO M-6).

The amount of deleterious substances shall not exceed the following limits:

	<u>Percent by Weight Maximum</u>
Clay lumps	1.0
Coal & lignite	1.0
Material to be reasonably free of shale, alkali, mica, coated grains, & soft flaky particles.	

Organic impurities shall not exceed those specified in AASHTO T-21. Mortar making properties shall conform to AASHTO T-71 or ASTM C87.

Coarse aggregate for concrete shall conform to the following gradations for coarse aggregate size No. 3:

<u>Sieve Size</u>	<u>Percent Passing</u>
1 1/2 inch	100
1 inch	95 – 100
1/2 inch	25 – 60
No. 4	0 – 10
No. 8	0 – 5

The amount of deleterious substances shall not exceed the following limits:

	<u>Percent by Weight (Maximum)</u>
Coal & lignite	1.0
Clay lumps	0.5

Material to be reasonably free of shale, alkali, mica, coated grains, & soft flaky particles.

11.4 Water

Water for concrete shall be obtained from any source of potable water. Sources of non-potable water shall be approved before use.

11.5 Curing Compound

The curing compound shall be a liquid membrane-forming curing compound conforming to AASHTO M-148 Type I, with a fugitive dye and shall be applied to all finished concrete surfaces immediately after the concrete has set.

11.6 Air Entraining Admixture

Air entraining admixture shall conform to AASHTO M-154.

ES-12. CONCRETE CONSTRUCTION REQUIREMENTS

12.1 Mixing and Delivery

- A. Concrete shall be mixed and delivered by means of any of the following:
 - 1. Mixed complete in a stationary mixer and the mixed concrete transported to the point of delivery in agitating equipment or in non-agitating equipment when approved. (Known as central-mixed concrete.)
 - 2. Mixed completely in a truck mixer at the batching plant or while in transit. (Known as transit mixed concrete.)
 - 3. Mixed completely in a truck mixer at the point of delivery following the addition of mixing water. (Known as truck mixed concrete.)
 - 4. Mix partially in a stationary mixer and the mixing completed in a truck mixer. (Known as shrink-mixed concrete.)
- B. Truck mixers and truck agitators shall be operated within the rated capacity and at a speed of rotation for mixing or agitating as designated by the manufacturer of the equipment.
- C. When a stationary mixer is used for the complete mixing of the concrete, the mixing time for mixers having a capacity of 10 cubic yards or less shall be 60 seconds minimum. For 10 or more yards capacity, the mixing time shall be approved. Mixing time shall be

measured from the time all cement and aggregates are in the drum. The batch shall be so charged into the mixer that some water will enter in advance of cement and aggregates and all water shall be in the drum by the end of the first one-fourth (1/4) of the specified mixing time.

- D. For shrink-mixed concrete, the mixing time in the stationary mixer may be reduced to a minimum of 30 seconds. Mixing shall be completed in a truck mixer by not less than 50 or more than 100 revolutions of the drum or blades at mixing speed. The batch volume shall not exceed 70 percent of the gross volume of the drum.
- E. When a truck mixer is used for complete mixing each batch of concrete shall be mixed for not less than 70 nor more than 100 revolutions of the drum or blades at mixing speed. Additional mixing, if any, shall be at agitating speed.
- F. When a truck mixer or agitator is used for transporting concrete that has been completely mixed in a stationary mixer, mixing during transport shall be at the agitating speed.
- G. Unless otherwise approved, when a truck mixer or agitator is used for transporting concrete, the concrete shall be delivered to the site of the work and discharged completely within 1-1/2 hours or before the drum has been revolved 300 revolutions, whichever comes first, after the introduction of the cement to the aggregates. In hot weather or under conditions contributing to quick stiffening of the concrete, a time less than 1-1/2 hours may be directed. When a truck mixer is used for the complete mixing of the concrete, the mixing operation shall begin within 30 minutes after the cement has been intermingled with the aggregates. If additional mixing water is required to replace evaporated mixing water to maintain the specified slump and is added with the permission of the Engineer, a minimum of 20 revolutions of the truck mixer drum at mixing speed shall be required before discharge of any concrete.

Tests for consistency may be made at approximately the beginning, the midpoint, and the end of the load. If the results vary by more than the tolerance specified below, the mixer or agitator shall not be used until the condition is corrected.

<u>When Average Slump is</u>	<u>Tolerance</u>
3 inches or less	1/2 inch
More than 3 inches	1 inch

- H. Central mixing concrete may be transported in suitable non-agitating equipment. The bodies of such equipment shall be smooth, watertight metal containers.

12.2 Re-tempering

Concrete shall be mixed only in such quantities as are required for immediate use and shall be used while fresh before initial set has taken place. Any concrete having initial set before placing and finishing shall be wasted and not used for the work. No re-tempering of concrete (remixing with water or other materials) will be allowed, unless otherwise approved by the Engineer, and in

no instance shall concrete be re-tempered at a rate in excess of 1 gallon of water per 1 cubic yard of concrete remaining in the truck.

12.3 Placing Concrete

General. Concrete shall not be placed until forms have been checked and approved by the Engineer. The forms shall be clean of all debris before concrete is placed. Concrete shall be placed so as to avoid segregation of the materials and the displacement of the reinforcement. Care shall be taken to fill each part of the form by depositing the concrete as near the final position as possible. After initial set of the concrete, the forms shall not be jarred and no strain shall be placed on the ends of projecting reinforcement.

12.4 Cold Weather Concreting

Heating and Placing Concrete. Before any concrete is placed, all snow and frost shall be completely removed. Concreting operations shall meet the following requirements when the ambient temperature falls below 40 degrees F.

To achieve adequate curing, the temperature of the concrete shall be maintained above 50°F during the entire curing period or 7 days, whichever is greater. The concrete temperature shall not be allowed to fall below 35°F during this time. Prior to placing concrete in cold weather, the Contractor shall provide a written procedure for cold weather concreting to the Engineer. The procedure shall detail how the Contractor will adequately cure the concrete and prevent the concrete temperature from falling below 35°F. Extra protection shall be provided for areas especially vulnerable to freezing (such as exposed top surfaces, corners and edges, thin sections, and concrete placed into steel forms). Concrete placement will only be allowed if the Contractor's cold weather protection plan has been approved by the Engineer.

The Contractor shall furnish concrete that will have a temperature of at least 50 degrees F and not more than 80 degrees F at the time of placing. Heating equipment shall heat all the materials uniformly. Such heating shall prevent the occurrence of non-uniform moisture contents or contamination in the aggregates. Aggregates shall be heated in a manner such that frozen lumps, ice and snow are eliminated. The average temperature of an individual batch of aggregate shall not exceed 150 degrees F.

The Contractor is solely responsible for protecting concrete from inclement weather during the entire curing period. Permission given by the Engineer to place concrete during cold weather will in no way ensure acceptance of the Work by the Contracting Agency. Should the concrete placed under such conditions prove unsatisfactory in any way, the Engineer shall still have the right to reject the Work although the plan and the Work were carried out with the Engineer's permission.

12.5 Placing in Hot Weather

The temperature of the concrete shall not exceed 80 degrees F at the time of placement. When the combination of ambient air temperature, concrete temperature, humidity and wind is such that rapid evaporation of moisture from the concrete surface will take place, the Contractor shall

take measures to slow the evaporation to tolerable limits. Such measures may include, but not limited to, erecting sun shades or placing at night or early morning. Ice may be used as a part of the mixing water providing it has completely melted by the time mixing is completed.

12.6 Finishing Concrete

If, in the judgment of the Engineer, rock pockets are of such extent or character as to materially affect the strength of the structure or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of that portion of the structure affected. All holes and depressions shall be cleaned, thoroughly wetted, and filled with cement mortar composed of one part of cement to two parts of sand. All fins caused by form joints and other projections shall be removed above ground line. The resulting surfaces shall be reasonably smooth and uniform in texture and color. After the concrete is placed, it shall be struck off with a template or a vibrating screen. Concrete shall be finished to an even surface by means of both longitudinal and transverse floats. The use of power trowels will not be permitted.

When concrete sidewalk has hardened sufficiently the surface shall be given a broom finish. The broom shall be of an approved type. The stroke shall be perpendicular to the centerline with adjacent strokes, slightly overlapped. The finish shall be free from porous spots, irregularities, depressions, small pockets or rough spots.

12.7 Curing Concrete

Concrete surfaces shall be kept completely and continuously moist until a curing method is applied. Curing compound shall not be applied to concrete surfaces before the finishing has been acceptably completed and shall not be applied to construction joints or to the inside faces of joints to be sealed with silicone joint sealer. The curing compound shall not be applied during rainfall.

Prior to completion of the curing period, if any membrane surface is marred or damaged by scuffing and wear, the Engineer may require an immediate application of the same type membrane or water cure for the remainder of the cure period.

Membrane forming curing compounds shall be thoroughly mixed before use and agitated during application to prevent settling of the suspended solids. The membrane must be uniformly applied.

Membrane forming curing compounds shall be applied to the finished concrete immediately after the bleed water or free-water sheen leaves the surface of the finished concrete surface.

The curing compound shall be a liquid membrane curing compound conforming to AASHTO M-148 Type I. Curing compound shall be applied under pressure, at the rate of application as directed, and shall be at least 1 gallon per 200 square feet for each application. All concrete cured by this method shall receive two applications of the curing compound for a total minimum coverage of 1 gallon per 100 square feet. The first coat shall be applied immediately after stripping the forms and/or acceptance of the concrete finish. If the surface under the forms has

dried the concrete shall be thoroughly wet with water and the curing compound applied just as the surface film of water disappears. The second application shall be applied after the first application has set. During curing operations all unsprayed exposed surfaces shall be kept wet with water.

Should the film become damaged from any cause, within 10 days, the damaged portion shall be repaired immediately with additional compound.

If this curing compound is applied to construction joints, it shall be removed by sandblasting before fresh concrete is placed against them.

All membrane forming curing compounds shall be accompanied by a Manufacturer's Certificate of Compliance and shall be approved by the Engineer, prior to its use.

12.8 Correction of Work After Completion of Construction – Two Year Warranty

The contractor/person installing the concrete shall be responsible for faulty and/or non-conforming materials or workmanship for a period of two (2) years from the date of the initial installation; he/she shall remedy any defects due thereto. The City shall give notice of observed defects with reasonable promptness.

Surface scaling (or spalling) of the new concrete surface will be the fundamental consideration for determining non-conforming workmanship and materials requiring remediation. Scaled surfaces exceeding 5% (randomly dispersed or concentrated) per twenty (20) square feet of concrete surfacing area will be considered defective and shall be replaced. Manner and method as well as configuration of the area requiring replacement will be as directed and approved by the City Engineer. All replacement of concrete shall be as per City standards and at the Contractor's expense.

ES-13. CONCRETE CURB

13.1 General

All concrete curb shall conform to the City of Moscow Standard Drawings, the Plans, and Specifications. Concrete for curbs shall conform to the requirements of ES-11 CONCRETE and ES-12 CONCRETE CONSTRUCTION REQUIREMENTS of these specifications.

13.2 Forms

Curb forms shall be set to line and grade as designated; securely staked, and so constructed as to result in finished lines true to the dimensions and shapes shown on the plans.

Forms shall be of wood or metal, straight and free from warp, and of sufficient strength to resist springing while placing concrete. Where a section must be constructed on a curve, straight lengths of the section shall be short enough that the middle ordinate to the curve, from the face of that section, does not exceed one-half (1/2) inch or the section shall be continuously curved.

13.3 Joints

Expansion joints (or thru joints) shall be provided at intervals of forty-eight (48) feet throughout the length of the curb and at the junction of straight curb and radii and at either end of a driveway or alley section. Pre-formed joint fillers of one-half (1/2) inch or three-eighths (3/8) inch thickness will be placed in expansion joints.

every 8-feet, or match adjacent sidewalk.

Contraction joints (or "Dummy Joints") shall be constructed every ~~sixteen (16) feet~~. These joints shall be 1/8 inch minimum thickness and constructed to a minimum depth of 1-1/2 inches by scoring with a tool which will leave the corners rounded and destroy aggregate interlock.

13.4 Construction Requirements

- A. Dimensions. All curbs, unless otherwise specified, shall be in accordance with dimensions conforming to one of the types shown on City of Moscow Standard Drawings as specified by the approved project plans.
- B. Consistency. All Class A curb (cast in place) shall be of good plastic consistency and shall have a slump of three (3) inches and shall be tested by the Engineer according to the provisions of AASHTO T-119.

All Class C curb (extruded) shall meet the requirements for Class A curb, except for the amount of slump which may vary according to the conditions of the concrete mix and the extrusion equipment used. Under no circumstances however, shall the finished curb vary more than one-half (1/2) inch from the design elevation, and not more than ten (10) percent from the dimensions shown in the City of Moscow Standard Drawings and Specifications. Class C curbs will not require expansion joints.

13.5 Finishing

While the concrete is still green, the top and front face, or other exposed portions of the curb, shall be troweled to produce a uniform even surface then given a fine brush finish with brush strokes parallel to the long axis of the curb. Form marks and other irregularities shall be removed. The edges of the curb shall be rounded with an edger. Honeycombed areas in the back of the curb, that in the opinion of the Engineer are not detrimental to the curb, need not be patched.

13.6 Curing

Immediately after finishing, the concrete shall be cured in accordance with the requirements of ES-12.7, Curing Concrete.

13.7 Backfilling

All curb shall be backfilled as described herein. If sidewalk or concrete pavers are to be constructed behind the curb, all backfill material shall be 3/4" minus crushed aggregate. If the area behind the curb is to be lawn or planted area, the top 16 inches shall be topsoil. All denuded areas shall be fertilized, resown with grass seed and covered with mulch as specified in Sections ES-27 and ES-28.

13.8 Payment

Payment shall be as described in Section 01025

~~The accepted quantities of curb will be paid for by the unit price per linear foot. Compacted aggregate base under the curb and curb and gutter pan at catch basin locations will be considered incidental to the unit price for the curb. The unit price per linear foot shall include all materials, labor, equipment and other costs incidental to constructing concrete curb as herein specified and as shown on the Plans and special drawings.~~

ES-14. CONCRETE SIDEWALK

14.1 General

All concrete sidewalk, including driveways, shall conform to the City of Moscow Standard Drawings, Contract Plans, and Specifications. Concrete for sidewalks shall conform to the requirements of ES-11 CONCRETE and ES-12 CONCRETE CONSTRUCTION REQUIREMENTS of these specifications.

14.2 Gravel Base

Gravel base shall be per ES-7

Sidewalk shall be constructed on a compacted base of (3/4) inch minus crushed rock; base aggregate shall be placed on compacted, non-pumping subgrade. The crushed rock shall have the following gradation:

<u>Sieve Size</u>	<u>Percent Passing</u>
1 inch	100
3/4 inch	90 – 100
No. 4	40 – 65
No. 8	30 – 50
No. 200	3 – 9

The sand equivalent shall not be less than 30 if 5 percent or more of the material passes the No. 200 sieve. Sand equivalent will not be required if less than 5 percent passes the No. 200 sieve.

The total thickness of the gravel base shall be at least six (6) inches, compacted, in-place.

The gravel base shall be graded, rolled, tamped, or otherwise compacted to ninety-five (95) percent of the maximum density determined in accordance with AASHTO T-99.

The gravel base shall be thoroughly sprinkled with water before the concrete is placed.

All cost for furnishing and placing gravel base for sidewalks shall be included in the unit price bid on the bid proposal form for constructing concrete sidewalks. No additional compensation will be made for this gravel base.

14.3 Construction requirements

- A. Dimensions. Sidewalk width, thickness, and reinforcement shall be as shown on the City of Moscow Standard Drawings.

Sidewalk shall have a cross slope of between 1% and 2%, unless otherwise approved by the Engineer.

- B. Forms. Side forms shall be rigid and shall bear full length on the compacted gravel base and shall be the full depth of the finished walk. Forms shall be well staked, braced or otherwise rigidly held to true line and grade and shall rest upon stakes driven into the ground at intervals sufficient to provide rigid support. If metal forms are used they shall be of a type satisfactory to the Engineer.

- C. Placing and Finishing Concrete. SLUMP SHALL NOT EXCEED FIVE (5) INCHES. The concrete shall be spread uniformly between the forms and thoroughly consolidated and leveled with an approved strikeboard. Expansion joints of premolded joint material one-half (1/2) inch thick or three-eighths (3/8) inch thick may be constructed through the sidewalk at intervals of twenty (20) feet. Expansion joints may also be located where new sidewalk meets existing concrete, unless otherwise approved by the Engineer. Where applicable, joints in sidewalks and curb shall coincide.

After the concrete has been thoroughly consolidated and leveled it shall be bullfloated to eliminate high and low spots and to embed large aggregate. The concrete shall then be allowed to harden properly before jointing, edging, and brooming is completed.

Contraction joints shall be tooled into the concrete every four feet for four foot wide sidewalk and five feet for five foot wide sidewalk, shall be 3/8 inch minimum in depth, and shall be perpendicular to the direction of the walk. All joints shall then be edged with a 3/8 inch radius edger and the sidewalk edges shall be tooled with a one-half (1/2) inch radius edger.

After edging and jointing has been completed the concrete shall be smoothed with wood or metal hand floats. The floated surface shall then be coarse broomed uniformly in a transverse direction with a fiber hair brush or an approved type.

The placing and furnishing of all sidewalk shall be performed under the control of the Engineer, or his/her representative, and the tools shall meet with his/her approval.

The contractor shall keep a person at the job site for a minimum of four hours following the concrete surface brooming operation for the purpose of both preventing and repairing any damaged surfacing to the newly placed concrete. Concrete left unattended, if damaged or defaced shall be replaced at contractor expense.

- D. Curing. Curing shall be performed by applying a sealing compound conforming to AASHTO M-148 Type I to the surface of the concrete immediately after it has set sufficiently to permit such application. Curing shall conform to Section ES-12.7, Curing Concrete.
- E. Backfill. After removal of the forms, the area behind the sidewalks shall be backfilled and compacted with at least sixteen (16) inches of topsoil level with the sidewalk and curb. Less than 16 inches of topsoil may be approved where new sidewalk is being constructed along older streets. The topsoil shall be raked or otherwise leveled, taking care to break up large dirt clods and remove large stones. All denuded areas shall be fertilized, resown with grass seed and covered with mulch as specified in Sections ES-27, ES-28.

14.4 Payment

Payment shall be as described in Section 01025

~~The accepted quantities of concrete sidewalk will be paid for by the unit price per square yard. The unit price per square yard shall include all materials, labor, equipment, and other costs incidental to construction of concrete sidewalk, including aggregate base, as herein specified and as shown on the Plans and special drawings.~~

ES-15. SUPERPAVE HOT MIX ASPHALT

15.1 Hot Mix Asphalt

The Hot Mix Asphalt (HMA) pavement shall be placed in lifts to the thickness as specified on the Contract Plans and as required by the Standard Construction Drawings.

PAVEMENT THICKNESS SPECIFIED BY CITY OF MOSCOW DOCUMENTS (STANDARD DRAWINGS, STANDARD SPECIFICATIONS ETC.) SHALL MEAN THE FULLY COMPACTED, IN-PLACE DEPTH.

The materials of which the asphaltic concrete is composed shall be of such sizes and grading that, when proportioned and mixed together, they will produce a uniformly graded mixture, which when tested by means of laboratory screens, will conform to the requirements in the following table. The percentages of refer to the completed HMA mixture. All percentages shall be computed on the basis of weight. Screens and sieves used for determining the percentages of the different sizes of aggregate shall have square openings.

3/4" Superpave HMA Pavement CL SP-2 (Base Course)

Sieve Size	Percent Passing
1 inch	100
3/4 inch	90 – 100
1/2 inch	90 max
3/8 inch	52 – 80
No. 8	23 – 49
No. 200	2.0 – 8.0

1/2" Superpave HMA Pavement CL SP-2 (Surface Course)

Sieve Size	Percent Passing
3/4 inch	100
1/2 inch	90 – 100
3/8 inch	90 max
No. 8	28 – 58
No. 200	2.0 – 10.0

Superpave hot mix asphalt paving shall conform to the requirements, of the latest edition, of the Idaho Standards for Public Works Construction and amendments thereto. A copy of said specifications is available at the office of the City Engineer. Paving asphaltic cement used will be PG58-22 or PG58-28, or an approved equal, and shall conform to the specifications, of the latest edition, of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction and amendments thereto.

Section 405, of the latest edition, of the Idaho Transportation Department Standard Specifications for Highway Construction and amendments thereto, shall apply as to the items of "Weather Limitations, Hauling Equipment, Pavers, Rollers, Mixing Plant, Spreading and Finishing, Joints, Rolling, Surface Smoothness."

A Hveem or Super Pave Mix Design shall be submitted with associated "Job Mix Formula" (JMF) for approval, if required by the City Engineer.

15.2 Rolling and Compaction

Rolling and compaction of the asphaltic concrete mat shall be done in accordance, with the latest edition, of the Idaho Transportation Department Standard Specifications for Highway Construction and amendments thereto.

Compaction shall be achieved, as per Section 810, of the latest edition of the Idaho Standards for Public Works Construction and amendments thereto. A copy of said specifications is available at the office of the City Engineer.

The cost of the rolling and compaction shall be included in the price of furnishing and placing superpave hot mix asphalt pavement.

15.3 Tack Coat

Tack coat shall be applied at all edges where the new asphaltic surface joins the existing pavement and shall be applied in accordance with Section 401, of the latest edition, of the Idaho Transportation Department Standard Specifications for Highway Construction and amendments thereto.

15.4 Payment

Payment shall be as described in Section 01025

The accepted quantities of superpave hot mix asphalt pavement will be paid for by the unit price per ton or per square yard. The unit price shall include all materials, labor, equipment, and other costs incidental to furnishing and placing the superpave hot mix asphalt pavement herein specified and as shown on the plans.

Weight slips in duplicate form shall accompany each load of superpave hot mix asphalt pavement to the construction site. Upon delivery of the material, one copy of the weight slip will be given to the Engineer, or his/her representative, and one copy will remain with the truck driver before the material is unloaded. Under no conditions will any weight slips be accepted by the Engineer, or his/her representative, after the material is unloaded from the vehicle. It shall be the responsibility of the Contractor to give the Engineer ample advance notice of the time when such material shall arrive on the job site in order to assure the presence of the Engineer, or his/her representative, at the job site during delivery of the material. The weight slips will be the only basis of determination of pay quantity for this item.

ES-16 CEMENT CONCRETE PAVEMENT

16.1 General

Portland cement concrete shall conform to Section ES-11 CONCRETE, of these Specifications except as modified by the following sections and subsections.

16.2 Aggregates

Aggregates shall possess such characteristics of shape and size that concrete, prepared from a mixture of fine and coarse material in the proportions specified, will be of satisfactory workability in the opinion of the Engineer. Regardless of compliance with all other provisions of these specifications, if the concrete is not of a workable character or when finished does not exhibit a proper surface, either the fine or the coarse aggregate or both shall be rejected or altered as required by the Engineer.

- A. Fine aggregate shall consist of sand or other inert materials, or combinations thereof approved by the Engineer, having hard, strong, durable particles free from adherent

coating. Fine aggregate shall be thoroughly washed to remove clay, loam, alkali, organic matter or other deleterious matter.

Fine aggregate with more than the maximum percentage passing any sieve may be accepted provided the mix proportions are adjusted to produce concrete having the same net water-cement ratio, slump and workability. Any resulting increase in the cement content shall be at the expense of the Contractor. Under no circumstances shall the fine aggregate, which has a grading finer than that permitted under Section 703, of the latest edition, of the Idaho Transportation Department Standard Specifications for Highway Construction, and amendments thereto, be used in paving concrete.

Fine aggregate shall develop in the mortar strength test, at an age of 7 days, a compressive strength of not less than ninety (90) percent of the strength of a mortar prepared with the same cement (AASHTO T-71 or ASTM C-87) .

- B. Coarse aggregate shall consist of gravel, crushed stone or other inert material or combinations, thereof approved by the Engineer, having hard, strong, durable pieces free from adherent coatings. Coarse aggregate shall be thoroughly washed to remove clay, loam, bark, sticks, alkali, organic matter, or other deleterious material.

Coarse aggregate containing more than the maximum percentage passing any screen may be accepted provided the mix proportions are adjusted to produce concrete having the same net water-cement ratio, slump and workability. Any resulting increase in the cement content shall be at the expense of the Contractor.

Coarse aggregate shall not be used, under any circumstances in paving concrete, when the amount by weight passing the screens exceeds the following:

3/4" square opening.....	70%
3/8" square opening.....	30%

- C. Properties of concrete aggregate shall be determined in accordance with the following methods of test:
1. Amount of Material Finer than No. 200 Sieve in Aggregates: ASTM Designation C-117.
 2. Organic Impurities: AASHTO T-113.
 3. Flexural Strength of Concrete: AASHTO T-104.
 4. Percentage of Particles of Less than 1.95 Specific Gravity: AASHTO T-150.
 5. Clay Lumps in Aggregates: AASHTO T-112.
 6. Abrasion of Coarse Aggregate by Use of the Los Angeles Machine; AASHTO T-96.

16.3 Curing and Protection

- A. Curing and protection shall conform to the specifications of Section 703, of the latest edition, of the Idaho Standards for Public Works Construction and amendments thereto. A copy of said specifications is available at the office of the City Engineer.

16.4 Joint Fillers and Sealants

- A. Joint fillers and sealants shall conform to the specifications of Section 705, of the latest edition, of the Idaho Standards for Public Works Construction and amendments thereto. A copy of said specifications is available at the office of the City Engineer.

16.5 Air-Entrained Concrete

Air-entrained concrete shall be used, as per ES-11, unless otherwise provided for in the Special Provisions. Either air-entrained Portland cement or an air-entraining admixture shall be added at the mixer.

The volume of air in freshly mixed concrete shall conform to that specified in the table which follows:

AIR CONTENT OF FRESHLY MIXED CONCRETE

Maximum Size of Coarse Aggregate (Inches)	Air Content (Percent by Volume)
1-1/2, 2, and 3	5 ± 1
3/4 and 1	6 ± 1
3/8 and 1/2	7-1/2 ± 1

If the measured air content is found above or below the values contained in the table, the Contractor shall immediately make changes in mixing or materials as will be necessary to comply with the requirements for air content.

If an air-entraining agent is used, it shall be introduced at the nominal rate of one fluid ounce per sack of cement, but the rate shall be varied if necessary to comply with the requirements for air content.

An automatic dispenser accurate to 10%, which will introduce into the mixing water the specified amount of air-entraining agent for each cycle of mixing, shall be connected to the mixer.

Aggregates shall be adjusted to compensate for increased yield resulting from air-entrainment so that the specified amount of cement is contained in each cubic yard of concrete. Adjustment shall be made by decreasing the weight of fine aggregates only, unless otherwise directed by the Engineer.

Other Admixtures: Calcium chloride or any other admixture for any purpose other than air-entrainment may be added only upon the approval of the Engineer and under his/her supervision.

16.6 Reinforcing Steel

Reinforcing steel shall consist of round or square deformed bars or wire mesh. Square twisted bars shall not be used.

- A. Deformed steel bars for concrete reinforcement sizes No. 3 through 11 shall conform to the requirements of ASTM A-615M, Billet Steel Bars for Concrete Reinforcement, Grade 60, except as noted on the plans and except that the bars shall be made only by the open-hearth process or the electric furnace process.

The form of the deformed bars shall conform to ASTM A-706M, Minimum Requirements for Deformations of Deformed Steel Bars for Concrete Reinforcement.

Deformed bars size No. 14 and size No. 18 for concrete reinforcement shall conform to the requirements of ASTM A-615M, Special Large Size Deformed Billet Steel Bars for Concrete Reinforcement Intermediate Grade.

- B. Wire mesh for concrete reinforcement shall conform to the requirements of the standard specifications of AASHTO M-55, Welded Steel Wire Fabric for Concrete Reinforcement. All wire mesh shall be of an approved kind and quality of manufacture.
- C. Tie bars shall be free from rust, loose mill scale, dirt, grease or other defects affecting the strength or bond with the concrete.

16.7 Measurement of Materials

The fine aggregate and each size of coarse aggregate shall be measured by weighing. Corrections shall be made for variations in weight of material due to moisture content and specific gravity. The quantities of aggregates used in each batch shall be such that the cement can be measured in full sacks unless it is weighted in bulk.

Fine and coarse aggregate shall be proportioned by weight, except that if the project is small, then volumetric proportioning may be used with permission of the Engineer. In proportioning, the unit of measure for cement will be by the sack, ninety-four (94) pounds.

Weights of fine and coarse aggregate are based on a bulk specific gravity, saturated surface dry, of 2.67. When volume measurements are used, one cubic foot of sand shall be taken as equivalent to 100 pounds of sand and one cubic foot of gravel shall be taken as equivalent to 105 pounds of gravel. Corrections must be made for contained moisture in the aggregates and variations in specific gravity.

Concrete mixes shall be proportioned to the satisfaction of the Engineer. The proportion of aggregate may be altered to give better workability only upon written approval of the Engineer.

16.8 Re-tempering

Concrete shall be mixed only in such quantities as are required for immediate use and shall be used while fresh before initial set has taken place. Any concrete having initial set before placing and finishing shall be wasted and not used for the work. No re-tempering of concrete (remixing with water or other materials) will be allowed.

16.9 Construction of Portland Cement Concrete Pavement

Construction of Portland cement concrete pavement shall conform to the requirements of Section 705, of the latest edition, of the Idaho Standards for Public Works Construction and amendments thereto. A copy of said specifications is available at the office of the City Engineer. Concrete pavement batches shall meet the requirements of Section 703, of these Standard Specifications.

Concrete batch proportions shall be approved by the Engineer and any subsequent changes to the approved batch must be made in writing by the Engineer.

16.10 Payment

Payment shall be as described in Section 01025

The accepted quantities of Portland cement concrete pavement will be paid for by the unit price per square yard. The unit price per square yard shall include all materials, labor, equipment and other costs incidental to furnishing and placing the Portland cement concrete pavement herein specified and as shown on the plans.

Batch slips in triplicate form shall accompany each load of concrete for pavement delivered to the construction site. Upon delivery of the material, one copy of the batch slips will be given to the Engineer, or his/her representative, and one to the Contractor. Delivery of concrete shall mean discharged from the mixer truck and all water added to the mix shall be added to the batch slip. It shall be the responsibility of the Contractor to give the Engineer ample advance notice of the time when such material shall arrive at the job site in order to assure the presence of the Engineer, or his/her representative, at the job site during material delivery. The batch slips may be used for the determination of cross section conformity.

1. All catch basins shall be separated from the pavement and curb by boxing out around basin. Expansion joint material shall extend completely through curb and slab. Manhole castings within the pavement limits shall be boxed in like manner except when telescoping type castings are used.
2. When a joint falls within 5 feet of, or contacts, basins, manholes or other structures, shorten one or more panels either side of opening to permit joint to fall on round structures and at or between corners of rectangular structures.

3. All transverse joints must extend through curbs and must be continuous across pavement, except tied transverse construction joints. Expansion joints will not be required except at structures or as shown on the plans.
4. Transverse sawed joints to be a + 15' o.c. as shown on drawings. Joints at 60' to be sawed the same day as placement. Intermittent joints at 15' to be sawed next day after placement. Longitudinal joints shall be sawed prior to permitting traffic on the pavement.

ES-17. ADJUSTMENT OF GATE VALVE BOXES, MONUMENTS, CATCH BASINS, CATCH INLETS, AND MANHOLES

Gate valve boxes, catch basins, catch inlets, monument casings, and manholes shall be adjusted to the grade, as established by the Engineer. Valve boxes, casings, rings and covers shall be reset in a careful and workmanlike manner to conform to the new grade. Special care shall be exercised in all operations in order not to damage the structures, equipment or water mains. Any damage occurring to the manholes, catch basins, gate valves, monuments, water meters or water mains, due to the contractor's operation, shall be repaired at the contractor's expense. Any masonry adjustment shall be made by using pre-cast risers, bricks, concrete blocks or poured concrete.

The Contractor shall notify the appropriate utility company, in advance, if gas valve boxes need to be adjusted, so the utility company personnel can do so, in a timely manner.

The Contractor shall notify the City Water Department, in advance, if water meter boxes need to be adjusted, ~~so the Water Department personnel can do so, in a timely manner.~~
Contractor to adjust per specifications.

Location of valve boxes, catch basins and manholes on the plans is approximate only. They will be accurately located and referenced by the Engineer, or his/her representative, whenever possible. Manhole lids and catch basin and monument covers and valve box lids shall, preferably, be set to grade following the final application of asphaltic concrete. During paving operations, tops of manholes, monuments, catch basins and valve box lids shall be covered with building paper, diesel oil, or other suitable material to prevent sticking of asphalt to the metal lids.

Where excavation is necessary to adjust the grade of manholes, catch basins, monuments, or valve boxes, the backfill shall be carefully placed and tamped by hand.

~~Payment for adjustment of manholes, catch basins, gate valves, and monuments will be made according to the unit price for each unit adjusted:~~

Payment shall be as described in Section 01025

The unit price bid shall include all costs incurred in furnishing materials and labor necessary to adjust the particular units to grade.

ES-18. MANHOLES AND CATCH BASINS

18.1 General

Catch basins, catch inlets, and manholes shall be precast reinforced concrete units, furnished and installed in accordance with the project plans, these Standard Specifications, and the Standard Drawings.

Completed catch basins and manholes including ring shall be capable of withstanding, with a reasonable margin of safety, a concentrated load of 20,000 pounds.

Backfill shall be placed in horizontal layers no more than 6 inches thick with each layer compacted to 95 percent of the maximum density or as approved by the Engineer.

18.2 Precast Reinforced Concrete Manholes, Catch Basins, and Catch Inlets

Precast reinforced manholes, catch basins, and catch inlets sections shall conform to AASHTO M-199, ASTM C-478 and ASTM C-433 and as shown on the Standard Construction Drawings.

- A. Base Sections. Base shall be placed on a well graded dewatered granular bedding course. The bedding course shall be firmly tamped and made smooth and level to assure uniform contact and dimensions shall conform to the standard drawings. If the base is cast in place, the concrete shall conform, to the latest edition, of the Idaho Transportation Department Standard Specifications for Highway Construction Class 30 concrete. Where water is encountered at the site all cast in place bases shall be placed on a one-piece waterproof membrane so as to prevent any movement of water into the fresh concrete.
- B. Joints. All lift holes and all joints between precast elements shall be first filled with an asphaltic fiber material then finished smooth with mortar. The fiber shall be Ramneck brand or approved equal.
- C. Steps. Not required.
- D. Workmanship and Finish. Cones and sections shall be substantially free from fractures, large and deep cracks and surface roughness. In precast sections where loops have been provided in lieu of lift holes, the loops shall be removed flush with the inside wall surface after the manhole or catch basin has been completed. No sharp cut-off protrusions will be permitted. If concrete spalling occurs as a result of loop removal, the spalled area shall be restored in workmanship manner to a uniform smooth surface with mortar.

18.3 Rings and Lids

Rings and lids shall be cast iron and shall conform to the Standard Drawings. Castings shall conform to the requirements of ASTM A-48 Class 138 and shall be free of porosity shrink cavities, cold shuts or cracks, or any surface defects which would impair serviceability.

18.4 Sanitary Sewer Manholes

- A. General. Sanitary sewer manholes shall be constructed according to Plans, Standard Drawings and Specifications. All sanitary manholes shall be constructed of precast reinforced concrete sections.

~~The Contractor may construct the manhole by either running sewer pipe through the bottom of the manhole, peeling concrete around the pipe and breaking out the upper half of the pipe, or by pouring concrete in the bottom of the manhole and forming a channel through the manhole by hand.~~

- B. Basis of Payment. Sanitary sewer manholes shall be paid **Payment shall be as described in Section 01025** to the unit price per each or per vertical foot.

~~The unit price bid shall include all cost incurred in furnishing materials, labor, excavation, installing the manholes in place including the asphaltic coating on the outside of the manhole and the manhole rings and lids, and backfilling.~~

- C. Watertightness

1. SANITARY SEWER MANHOLES SHALL BE CONSTRUCTED WATERTIGHT. All visible leaks (infiltrating subsurface water) shall be sealed; sealing shall be accomplished by a manner and method, in the opinion of the Engineer, that constitutes permanency. Leaks that cannot be sealed by Contractor shall be sealed either by the pressure grouting method (injected chemical sealants) or the interior surface coating method, utilizing a firm specializing in such services, at the Contractor's expense. Less than four minor drips in a single manhole will be considered negligible and will not require sealing.
2. Hydrostatic Testing.
 - a. All sanitary sewer manholes constructed in areas where subsurface water may, in the opinion of the Engineer, pond around them shall be hydrostatically tested in accordance with this specification.
 - b. Prior to testing, the manhole shall be completely constructed and all inlet and outlet pipes shall be plugged. The Contractor shall fill the manhole to the top with water. Four hours minimum after the manhole has been filled, the Contractor shall refill the manhole to the original water level and commence the test for a minimum 2-hour period. The leakage rate shall not exceed 0.2 gallons per hour per foot of test head above the pipe invert elevation. Manholes which fail the test shall be repaired and re-tested. Sources of non pass.
 - c. Manholes tested by the exfiltration method shall have all infiltrating water sealed prior to beginning the exfiltration test.

3. Vacuum Testing - per ISPWC 502 is allowed as an alternative to Hydrostatic Testing

18.5 Storm Sewer Manholes

- A. General. Storm sewer manholes shall be constructed according to the Plans, Standard Drawings and Specifications. Storm sewer manholes shall be precast reinforced concrete, unless otherwise approved by the Engineer.

All pipe extending into catch basins shall be trimmed within 1"-2" of the inside wall surfaces and shall be neatly grouted inside and out and watertight.

- B. ~~Basis of Payment. Storm sewer manholes shall be paid for by the unit price per each or per vertical foot.~~ Payment shall be as described in Section 01025

The unit price bid shall include all costs incurred in furnishing materials, labor, excavation, installing manholes in place including the manhole rings and lids, and backfilling.

18.6 Catch Basins and Catch Inlets

- A. General. Catch basins and catch inlets shall be constructed according to the Plans, Standard Drawings and specifications. Catch basins shall be precast reinforced concrete per WSDOT TYPE 1, catch inlets shall be WSDOT CONCRETE INLET - unless otherwise approved by the Engineer.

All pipe extending into basins and inlets shall be trimmed within 1"-2" of the inside wall surfaces shall be neatly grouted inside and out and watertight

Lids, grates, and risers shall be centered over the basin or inlet; unless specifically allowed otherwise.

- B. ~~Payment. Catch basins will be paid for by the unit price per each or per vertical foot.~~ Payment shall be as described in Section 01025

The unit price shall include all cost incurred in furnishing materials, labor, excavation, installing catch basins in place including the catch basin rings and lids, and backfilling.

18.7 Risers

- A. Risers for height adjustment shall be as per WSDOT's standard for the precast unit being furnished.

ES-19. TRENCH EXCAVATION AND BACKFILL

19.1 Scope

This section covers the work necessary for the trench excavation and backfill above the pipe zone. Pipe zone backfill is included under the specification for the pipe.

19.2 Type of Backfill

The class of backfill to be used above the pipe zone shall be as set forth on the Plans or as given in the project Special Provisions and if not specifically set forth in project documents then as required by the “use” description given herein. The right is reserved to modify the use, location, and quantities of the various types of backfill, during construction, as the Engineer considers being in the best interest of the Owner.

Trench backfill, above the pipe zone, shall be as follows:

1. Class A Backfill. Use in landscaping and agricultural type areas where lawn sod, shrubs, topsoil, fences, and other landscape items are either being replaced or are anticipated.
2. Class B Backfill. Use within existing or proposed gravel parking lots – not within gravel streets or alleys.
3. Class C Backfill. Use in areas where asphalt pavement, concrete, curb, sidewalk, gravel surfacing, landscaping and agricultural use is not anticipated, present or future.
4. Class D Backfill. Use in existing gravel streets and alleys, existing gravel roadway shoulders and in areas where asphalt pavement, concrete, curb, and sidewalk is existing or anticipated in the future.
5. Class E Backfill. Use in lieu of Class D Backfill in new streets when specifically allowed by the City Engineer.
6. Class F Backfill. Use within and immediately adjacent to existing asphalt paved streets, alleys, driveways, and parking lots.

19.3 Excavation and Backfill for Fire Hydrants

~~Excavation and backfill for fire Hydrants (See ES-22).~~

Payment shall be as described in Section 01025

~~ice payment for Fire~~

19.4 Trench Excavation

Trench excavation shall be classified as common excavation or rock excavation and shall include whatever materials are encountered to the depths as shown or as directed by the Engineer.

Common Excavation. Common excavation is defined as the removal of all material which is not classified as rock excavation.

Rock Excavation. Rock excavation shall conform to all specifications of Section 302, of the latest edition, of the Idaho Standards for Public Works Construction and amendments thereto. A copy of said Specifications is available at the office of the City Engineer.

19.5 Materials

- A. Foundation Stabilization. Materials for foundation stabilization shall be 3/4 inch minus crushed rock with reasonable even gradation from coarse to fine and free from excessive dirt or other foreign material.
- B. Granular Material. Granular backfill shall be 3/4 inch minus crushed basalt conforming to ES-7 CRUSHED ROCK BASE.
- C. Imported Topsoil. Imported topsoil shall possess friability and a high degree of fertility. It shall be free of clods, roots, gravel and other inert material. It shall be free of quack grass, horsetail and other Import Topsoil shall be per ES-27 should such regenerative material be present in the soil, it shall be the Contractor's responsibility to remove all such growth, both surface and root, which may appear in the planting within one year following acceptance of the job, at his/her own expense, and in a manner satisfactory to the Owner.
- D. Compaction Equipment. Compaction equipment shall be of suitable type and adequate to obtain the amount of compaction specified. Compaction equipment shall be operated in strict accordance with the manufacturer's instructions and recommendations and shall be maintained in such condition that it will deliver the manufacturer's rated compactive effort.

19.6 Workmanship

- A. Clearing. Do not remove existing trees or tree limbs over 2 inches in diameter, whether on public or private property, unless they are within 4 feet of the pipe centerline without permission from the Engineer. All such work shall conform to the City's Community Forestry ordinance. The Contractor shall bear all costs of disposing of trees, stumps, brush, roots, limbs, and other waste materials from clearing operations. Material shall be disposed of in such a manner as to meet all requirements of state, county and local regulations regarding health, safety and public welfare.
- B. Obstructions. This term refers to obstructions which may be removed and do not require replacement. Obstructions within the trench area or adjacent thereto such as tree roots, stumps, abandoned piling, buildings and concrete structures, logs, rubbish and debris of all types shall be removed without additional compensation from the Owner. The Engineer will, if requested, make changes in the trench alignment to avoid major obstructions; if such alignment changes can be made within the perpetual easement and right-of-way and without adversely affecting the intended function of the facility.

The contract amount will be adjusted accordingly for any cost changes resulting from such alignment modifications.

Dispose of obstructions removed from the excavation in accordance with section ES-4 REMOVALS AND DISPOSALS.

- C. Utility Repairs. Any and all underground utility damaged in any way during trench excavation shall be repaired and properly backfilled, by the Contractor, at no cost to the City. The repair shall be as approved by the City – NO EXCEPTIONS.
- D. Removal and Replacement of Topsoil. In all cases where trenches cross lawns, garden areas, pasture lands, cultivated fields, or other areas on which reasonable topsoil conditions exist; first remove the topsoil for a depth of 10 inches for the full width of the trench to be excavated. Stockpile this topsoil to one side of the right-of-way and do not mix with the remaining excavated material. Replace the topsoil in the top 10 inches of the backfilled trench. In lieu of stockpiling the top 10 inches of soil, “Imported Topsoil” from borrow pits may be substituted in the top 8 inches. Maintain the finished grade of the topsoil, over the center line of the trench, level with the immediate area bordering the trench, until acceptance of final seeding. Correct all damage to adjacent topsoil caused by trenching or pipe laying operations by removal of all rock, gravel, clay, and any other foreign materials from the surface and by regrading the additional topsoil as required.
- E. Pavement, Curb and Sidewalk Removal. Cut (full depth) all asphaltic concrete or Portland Cement concrete pavements (regardless of the thickness), and all curbs and sidewalks prior to excavation of the trenches with an approved pavement saw, hydrohammer or other approved pavement cutter. Removal of street surfacing for excavations shall comply with the Specifications and Standard Drawing for Street/Alley Curb Repair. Pavement and concrete materials removed shall be hauled from the site and not used for trench backfill.
- F. Trench Width. Minimum width of trenches in which pipe is to be laid shall be 18 inches greater than the inside diameter of the pipe except by permission of the Engineer.
- The maximum clear width at the top of the trench will not be limited, except in cases where excess width of excavation would cause damage to adjacent structures or property.
- In all cases, confine trench widths to dedicated rights-of-way for public thoroughfares or within areas for which construction easements have been obtained.
- G. Grade. Carry the bottom of the trench to the lines and grades shown, or as established by the Engineer, with proper allowance for pipe thickness and for pipe base or special bedding, when required. If the trench is excavated below the required grade, correct any part of the trench excavated below the grade, at no additional cost to the Owner, with gravel of the type specified for pipe zone material. Place the gravel over the full width of trench in compacted layers, not exceeding 6 inches deep, to the established grade with allowance for the pipe base or special bedding.
- H. OSHA Compliance. All trench excavation and backfill shall conform to the latest published OSHA regulations, NO EXCEPTIONS.
- I. Location of Excavated Materials. During trench excavation, locate the excavated material within the construction easement or right-of-way or specified working area so

or per manufacturer's recommendations (whichever is greater)

that the excavated material will not obstruct private or public traveled roadways or streets. It shall be the contractor's responsibility to conform with the federal, state and local codes governing the safe loading of all trenches with excavated material.

- J. Removal of Water. Provide and maintain ample means and devices which will promptly remove and dispose of all water entering the trench excavation during the time the trench is being prepared for the pipe laying, during the laying of pipe, and until the backfilling of the pipe zone has been completed. These provisions shall apply during the lunch hour as well as overnight.

Dewatering shall be per ISPWC Section 205 and Special Provisions

Dispose of the water in an approved manner without damage to adjacent property.

Drainage of trench waste through the pipeline, under construction, is prohibited.

- K. Foundation Stabilization. When, in the opinion of the Engineer, the existing material in the bottom of the trench is unsuitable for supporting the pipe, excavate below the flow line of the pipe, as directed by the Engineer, and backfill the trench to the subgrade of pipe base with approved material. Place the material over the full width of the trench in compacted layers, not exceeding 6 inches deep, to the established grade.

with foundation stabilization material per ES-19.5

- L. Backfill in Pipe Zone. Pipe zone backfill is included in the Specification for the pipe.

- M. Trench Backfill Above Pipe Zone. Do not push the backfill material into the trench in such a way as to permit free fall of the material into the open trench, until at least 2 feet of cover is provided over the pipe. Under no circumstances allow sharp, heavy pieces of material to drop directly onto the pipe or the tamped material around the pipe. Do not use backfill material of consolidated masses larger than 1 cubic foot.

- N. Classes of Backfill.
Trench backfill shall comply with the City's Standard Construction Drawings and as follows:

1. Class A Backfill

Backfill the trench, above the pipe zone, with approved excavated trench material to within 10 inches of final surface grade. Compact the entire trench depth in suitable lifts with a vibratory compactor, pneumatic or gasoline powered tampers, or hydraulic hammers. Determine the method and type of equipment and amount of compaction required to prevent subsequent settlement.

Where Class A backfill is specified replace topsoil in the top 10 inches of the trench. Compact and rake to match the ground surface adjacent to the trench.

Maintain the surface of the backfilled trench level with the existing grade until the entire project is accepted by the Owner. Any subsequent settlement of the finished surfacing during the warranty period shall be considered to be a result of

improper or insufficient compaction and shall be promptly repaired by the Contractor at no cost to the Owner.

2. Class B Backfill

Backfill the trench, above the pipe zone, with approved excavated trench material to within 6 inches of final surface grade. Compact the entire trench depth in suitable lifts with vibratory compactors, pneumatic or gasoline power tampers, or hydraulic hammers. Determine the method and type of equipment and the amount of compaction required to prevent subsequent settlement. Place and compact granular material in the top 6 inches.

Maintain the surface of the backfilled trench level with the existing grade by additions of granular backfill material, as specified, until final surface replacement is completed or the entire project is accepted by the Owner. Any subsequent settlement of the finished surface, during the warranty period, shall be considered to be a result of insufficient compaction and shall be promptly repaired by the Contractor at no cost to the Owner.

3. Class C Backfill

After the completion of the backfilling of the pipe zone, the excavated trench material may be pushed back into the trench by mechanical means.

In all locations where Class C backfill is used, the Contractor shall make his/her own estimate of the amount of backfill material required at the trench, so that after normal settlement has occurred, the finished surface will meet the existing grade. Neatly windrow the material over the trench and remove all excess. Any excess or deficiency of backfill material, which becomes apparent after settlement within the warranty period, shall be corrected by regrading, disposing of excess material or adding additional material where required. Remove rocks larger than 2 inches from the upper 8 inches of backfill.

4. Class D Backfill

Backfill the entire trench, above the pipe zone, with granular backfill material. Compact the entire trench depth to 95 percent density in 6 inch lifts with mechanical, vibrating or impact tampers. Determine the method and type of equipment and amount of compaction required to prevent subsequent settlement.

Maintain the surface of the backfilled trench level with the existing grade with crushed rock backfill material until final surface replacement is completed or the entire project is accepted by the Owner. Any subsequent settlement of the finished surface during the warranty period shall be considered to be a result of insufficient compaction and shall be promptly repaired by the Contractor at no cost to the Owner.

5. Class E Backfill

Class E trench backfill is to be used only where a new paved street is going to be constructed above the installed pipe.

The width of the trench, above the pipe zone, may be increased beyond the required specifications for pipe zone width, as described in the City of Moscow Standard Drawing #15, but shall not be less than (6) six feet.

Approved native excavated material may be used for backfill above the pipe zone in this widened trench. Compaction for all trench backfill, above the pipe zone, shall be 95% minimum of AASHTO T-99. All native backfill shall be placed in (6) six inch maximum lifts and method of compaction shall be only by a (5) five foot minimum wide sheepsfoot roller. Density testing frequency, for this approved native excavated material, will be in excess of that required for the Class 'D' crushed basalt backfill.

6. Class F Backfill

Backfill the trench, above the pipe zone, with granular material to within 4 inches of the finished surface.

Compact the entire trench, above the pipe zone, in six (6) inch maximum lifts with vibratory compactors, pneumatic or gasoline power tampers, or hydraulic hammers to a minimum 95 percent standard density. The top 4 inches of the trench is to have smooth cut edges before being backfilled with two equal lifts of asphaltic concrete patching mix.

7. Subsurface Drain Backfill

Backfill the entire trench to within 10 inches of the final surface grade or to the street subgrade, as applicable, with crushed or naturally occurring granular material from approved sources.

The material shall be washed, if necessary, to render the particles free from clay. It shall contain no more than 1% of clay lumps or other decomposed material. It shall conform to the following requirements for grading:

Sieve Size	Percent Passing
3"	100
2.5"	95 – 100
3/4"	50 – 80
1/4"	30 – 60
No. 8	20 – 50
No. 30	8 – 30
No. 50	3 – 12
No. 200	0 – 1.2

* All percentages are by weight.

That portion of the gravel backfilled for drains retained on a 1/4" square sieve shall not contain more than 0.05% by weight of wood waste.

Compaction, above the pipe zone, shall be accomplished by the use of mechanical, vibrating or impact tampers. Determine the method and type of equipment to use and amount of compaction required to prevent subsequent settlement.

Maintain the surface of the backfilled trench level with the existing grade by additions of granular backfill material as specified until final surface replacement is completed or the entire project is accepted by the Owner. Any subsequent settlement of the finished surface, during the warranty period, shall be considered to be a result of insufficient compaction and shall be promptly repaired by the Contractor at no cost to the Owner.

- O. Maintenance of Excavated Trench. Maintain the excavated trench between any two successive valved sections of pipeline or as specified in the project Special Provisions until the following operations have been completed, to the satisfaction of the Engineer, for waterline construction: Service connections have been installed, including pressure tap; valves, valve boxes, hydrants and thrust blocks installed, hydrostatic or air testing, sterilization, cleanup and restoration of all physical features, utilities restored to their original condition, or better, and in general, all work required between the two line valves accomplished with the exception of repaving.
- P. Maintenance of Trench Backfill. This maintenance shall include, but not be limited to, the addition of crushed rock backfill material to keep the surface of the backfilled trenches reasonably smooth and free from excessive ruts and potholes and suitable for normal traffic flow.

Trenches backfilled within existing paved streets shall be temporarily surfaced with 2.5 inches of cold mix asphalt pavement; which temporary cold mix surfacing shall be placed within one day of completion of trench backfilling. This temporary patch shall be installed and maintained smooth until the permanent hot mix patch is installed. Under certain circumstances, this requirement may be waived by the City Engineer.

No additional payment will be made for the maintenance of the trench backfill prior to completion of the work outlined above, and the trench backfill maintenance shall be considered as incidental to that item of work.

- Q. Disposal of Excess Excavation. All excess excavation not required or suitable for backfill shall be disposed of in a waste area arranged by the Contractor.
- R. Drainage Culverts. Replace, in like kind, drainage culverts which are removed or damaged. If the pipe is damaged during removal, dispose of it and furnish and install new pipe. Dispose of culvert pipe that is in too poor condition to reuse because of age or

physical conditions. Repair drainage pipes with manufactured fittings only; encase Ferncos in concrete.

- S. Blasting. Blasting shall conform to all specifications of Section 302, of the latest edition, of the Idaho Standards for Public Works Construction and amendments thereto. A copy of said specifications is available at the office of the City Engineer.

19.7 Payment

Payment shall be as described in Section 01025

Payment for trench excavation and backfill will be as specified for main line pipe as follows:

- A. Trench Excavation and Backfill. Payment for trench excavation and backfill shall be included in the price per linear foot of the respective pipe stated in the Contractor's bid proposal.

Payment for trench excavation and the respective backfill shall constitute full compensation for all work specified and incidental to the price per linear foot of the respective pipe.

Pipe zone backfill is specified under Section ES-20 PIPE.

- B. Rock Excavation. Rock excavation shall be measured for payment as the actual quantity of rock removed within the approved limits.

ES-20. PIPE

20.1 Storm Sewer Pipe

Mains, 4-inch to 15-inch: SDR 35 PVC ASTM D 3034, gasketed.

Mains, 18-inch to 36-inch: Solid wall PVC ASTM F 679 or HDPE (High Density Polyethylene) AASHTO M 294, smooth-walled interior, silt-tight.

Culvert Pipe: Corrugated Steel Pipe and Pipe Arches conforming to AASHTO M 36, 2-2/3" x 1/2 corrugations. Round pipe shall be 16 gage minimum; arch pipe shall be 12 gage minimum.

Storm Sewer Service Laterals: SDR 35 PVC ASTM D-3034, except as follows: where a service lateral crosses a water main or a water service line with less than 18 inches of clearance between the two pipes the sanitary sewer service lateral pipe shall be un-jointed PVC pressure water pipe, either Schedule 40 PVC or Class 160 PVC ASTM D-2241 for distance nominally ten feet each side of the crossing. This pressure water pipe shall be joined to standard SDR 35 PVC pipe at both ends with FERNCO couplers having stainless steel shear ring bands.

Reference ISPWC for Storm Drain Testing and CCTV Inspection Requirements per ISPWC Division 600

20.2 Sanitary Sewer Pipe

All sanitary sewer pipe shall be a minimum of eight (8) inch diameter except sewer to house connections which shall be a minimum of four (4) inch diameter.

Mains, 8-inch diameter and larger: SDR 35 PVC ASTM D-3034.

Service Laterals: SDR 35 PVC ASTM D-3034, except as follows: where a service lateral crosses a water main or a water service line with less than 18 inches of clearance between the two pipes the sanitary sewer service lateral pipe shall be un-jointed PVC pressure water pipe, either Schedule 40 PVC or Class 160 PVC ASTM D-2241 for distance nominally ten feet each side of the crossing. This pressure water pipe shall be joined to standard SDR 35 PVC pipe at both ends with FERNCO couplers having stainless steel shear ring bands.

Mains, 12-inch through 60 inch gravity sewer. CORRUGATED POLYPROPYLENE (CPP) PIPE,

1. Pipe requirements – 12-inch through 30-inch pipe shall have smooth interior and annular exterior corrugations. 30-inch through 60-inch shall be triple wall pipe and shall have smooth interior and exterior surfaces with annular inner corrugations.

- a. 12-inch through 30-inch pipe – dual wall pipe, ASTM 2736
- b. 30-inch through 60-inch – triple wall pipe, ASTM 2764
- c. 12-inch through 60-inch pipe shall have a minimum pipe stiffness of 46 psi when tested per ASTM D2412.

2. Joint Performance

- a. Pipe shall be joined with a gasketed integral bell and spigot joint meeting the requirements of ASTM F2736
- b. 12-inch through 60-inch pipe shall be watertight according to the requirements of ASTM D3212, with the addition of a 15 psi pressure requirement.
- c. Spigot shall have two gaskets meeting the requirements of ASTM F477.
- d. Gaskets shall be installed by the pipe manufacturer and shall be covered by a removable, protective wrap to ensure the gaskets are free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.
- e. 12-inch through 60-inch pipe shall have a reinforced bell with a polymer composite band installed by the manufacturer

3. Fittings

a. Fittings and connections shall provide a watertight connection according to the requirements of ASTM 3212. Gaskets when present, shall meet ASTM F477

4. Field Pipe and Joint Performance

a. To assure watertightness, field performance verification may be accomplished by testing in accordance with ASTM F1417 or ASTM F2487. Appropriate safety precautions must be used when field-testing any pipe material.

5. Material Properties

a. Polypropylene compound for pipe and fitting production shall be an impact modified copolymer meeting the material requirements of ASTM F2736 or ASTM 2764

6. Installation

a. Installation shall be per ASTM D2321 and manufacturer recommended installation guidelines.

20.3 Perforated Subsurface Drain Pipe

- A. General. A perforated roadway underdrain system may be shown on the Plans and shall be furnished and installed as herein described in these Specifications, as shown on the City's Standard Construction Drawings and as shown on the Plans.

Laterals will generally be connected to the collector at 60° angles. The terminal end of each lateral will be sealed with a plug. All connections between pipe sections and branches are to be water tight.

The pipe shall be wrapped with a filtering sock.

Perforated Subsurface Drain Pipe that is corrugated on the inside will not be allowed.

Perforated pipe and fittings shall not be dumped into the trench. All pipe shall be inspected prior to lowering into the trench and if necessary cleaned of any material tending to plug the perforations of the pipe.

Pipe shall be laid with the perforations at the bottom or as per manufacturer's instructions.

Gravel backfill for drains shall be as defined under Section ES-19 TRENCH EXCAVATION AND BACKFILL.

- B. Types of Pipe. Perforated subsurface drain pipe as indicated on the plans and standard drawings shall be one of the following types of pipe or as approved by the Engineer:

1. Perforated Corrugated Plastic Pipe

This pipe shall be Advanced Drainage System (ADS) N-12 pipe or approved equal. The pipe shall be 4" in diameter, having at least two (2) rows of perforations parallel to the axis of the pipe. The pipe and fittings shall meet the

requirements of AASHTO M-252 Type S (corrugated outside-SMOOTH INSIDE). The joints shall be gasketed non-water tight joints (Soil tight per AASHTO section 26); Gaskets may be architectural weather stripping material per ASTM D-1056 or rubber per ASTM F-477.

2. Perforated Solid Wall Plastic Pipe

This pipe shall be Advanced Drainage System (ADS) pipe or approved equal. The pipe shall be 4" in diameter, having at least two (2) rows of perforations parallel to the axis of the pipe. The pipe and fittings shall meet the requirements of AASHTO M-252. The joints shall be gasketed non-water tight joints (Soil tight per AASHTO section 26); Gaskets may be architectural weather stripping material per ASTM D-1056 or rubber per ASTM F-477.

20.4 Water Pipe & Ductile Iron Fittings

- A. Joints. Pipe joints shall be push-on joints except where specifically shown or detailed otherwise.
- B. Mechanical Joint Fittings. Three-inch through sixteen inch mechanical joint ductile iron fittings shall be Tyler SSB Class 350 ductile iron fittings, or an approved equal, and shall conform to ANSI/AWWA C-111
- C. Flanged Ductile Iron Fittings. Flanged fittings shall conform to ANSI/AWWA C-110 and shall be faced and drilled to 125-pound ANSI. The fittings shall be 125 PSI rated working pressure and cement-mortar lined to same thickness specified for pipe.
- D. Mechanical Couplings. Mechanical couplings, not a part of the pipe itself, shall be ductile iron couplings with long solid sleeves and be Mechanical Joint Class 350. Mechanical couplings shall mean straight couplings, transition couplings, reducing couplings, and flanged coupling adapters.
- E. Ductile Iron Pipe. All ductile iron pipe shall be centrifugally cast of 60-42-10 iron and shall conform to ANSI / AWWA C-151. Thickness class or classes shall be 51(minimum). The pipe shall be cement mortar lined and seal coated in accordance with ANSI / AWWA C-104. The rubber ring gaskets shall be suitable for the specified pipe sizes and pressure and shall conform to applicable parts of the latest federal specification ANSI / AWWA C-111, and shall be furnished by the pipe manufacturer. A nontoxic vegetable soap lubricant shall be supplied with the pipe in sufficient quantities for installing the pipe.
- F. Polyvinyl Chloride (PVC) Pressure Pipe. All PVC pressure pipe shall conform to pressure Class 150 AWWA C-900 or pressure Class 165 AWWA C-905. All pipe shall be push-on joints with one gasket bell end.
- G. Tapping Sleeves. All tapping sleeves shall be ROMAC "SST" Stainless Steel as per ASTM A-240, Type 304 and Type 304L or an approved equal.

20.5 Pipe Laying

Pipes shall be laid in straight lines at uniform rates of grade as shown on the plans.

Proper preparation of foundation, placement of foundation material where required, and placement of pipe zone material below the pipe shall precede the installation of all sewer, water and culvert pipe. This shall include necessary leveling of the native trench bottom or the top of the foundation material as well as placement and compaction of required pipe zone material, below the pipe, to a uniform grade so that the entire length of pipe will rest firmly on a well compacted material, so the backfill material around the pipe will be placed in a manner to meet requirements specified under backfilling.

Water pipe delivered for construction shall be handled so as to minimize entrance of foreign material. When pipe laying is not in progress as, for example, at the close of a day's work, all openings in the pipeline shall be closed by water-tight plugs. Joints of all pipe in the trench shall be completed before work is stopped. If water accumulates in the trench, the plugs shall remain in place until the trench is dry.

If dirt that, in the opinion of the Engineer, will not be removed by flushing enters the pipe, the interior of the pipe shall be cleaned and swabbed as necessary with a 5% hyperchlorite disinfecting solution.

- A. Backfill at the Pipe Zone. The pipe zone shall be considered to include the full width of the excavated trench from the bottom of the trench (a minimum of 4 inches under the pipe) to a point 12 inches above the top outside surface of the barrel of the pipe.

Particular attention must be given to the area of the pipe zone from the flow line to the center line of the pipe to insure that firm support is obtained to prevent any lateral movement of the pipe during the final backfilling of the pipe zone.

Backfill the area of the pipe zone from the bottom to the horizontal center line of the pipe with "imported pipe zone material." Hand place the material around the pipe in 6 inch layers and thoroughly hand tamp with approved tamping bars supplemented by "walking in" and slicing with a shovel.

All material, within the pipe zone, shall be hand tamped and done in such a manner as to not change the grade of the pipe (particularly gravity pipe).

- B. Joints. In making the joints on the pipe care shall be exercised to clean all dirt, rock or other foreign matter completely from the inside of the bells and the outside of the spigots. The pipe shall be forced tightly in place with a bar or mechanical puller of a type approved by the Engineer. When the pipe is aligned it shall be supported by placing sufficient backfill material alongside and carefully tamped into place as described under Section 20.5.A.

When two different types of gravity pipe are joined together, a Fernco coupler may be used, upon approval of the Engineer. The completed connection shall be supported, in such a manner, as to maintain established line and grade and shall be encased, on all sides, with a minimum of four (4) inches of concrete. The concrete shall extend a minimum of two (2) feet on each side of the coupler.

Lubricant for water pipe gaskets shall be supplied by the pipe manufacturer.

- C. Caps and Connections. Caps for pipe branches, stubs, or other open ends which are not to be immediately connected shall be made of an approved material and shall be secured in a place with a joint comparable to the main line joint, or stoppers may be of an integrally cast breakout design. Caps of the type recommended by the pipe's manufacturer shall be used.
- D. Imported Pipe Zone Material. Granular material for pipe zone backfill shall be 3/4" minus crushed rock unless otherwise specified. The material shall meet the specifications, of the latest edition, of the Idaho Transportation Department Standard Specifications for Highway Construction and amendments thereto.
- E. Water Main Location and Separation. The location and separation of the water and non-potable water main pipes, both horizontal and vertical, shall meet the most current requirements of IDAPA 58.01.08 – Idaho Rules for Public Drinking Water Systems.
- F. Permissible Deflection at Joints - Water Pipe. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or where long radius curves are permitted, the amount of deflection allowed shall not exceed the values in the following table: **and meet the installation requirements of the manufacture.**

***MAXIMUM DEFLECTION PERMITTED (18 FOOT LENGTH PIPE)**

Bell and Spigot		Mechanical Joint		Push-on Joint
Diameter (Inches)	Max. & Min. Deflection Angle (Degrees)	Deflection (Inches)	Max. Deflection Angle (Degrees)	Deflection (Inches)
6	7-07	27	5	19
8	5-21	20	5	19
10	5-21	20	5	19
12	5-21	20	5	19
14	3-35	13 ½	3	11
16	3-35	13 ½	2	11
18	3-00	11	3	11
20	3-00	11	3	11
24	2-23	9	3	11

*The maximum deflection shall be whichever is less, the table or that recommended by pipe manufacturer.

G. Anchorage (water pipe)

1. Limiting Pipe Diameter and Degree of Bend

On all pipelines 6 inches in diameter or larger, securely anchor by suitable thrust blocking all tees, plugs, caps, and bends where unbalanced forces exist, as directed by the Engineer.

2. Thrust Blocking

Provide thrust blocks as required by the Standard Construction Drawings. The concrete mix shall have a compressive strength of not less than 2500 psi. Place blocking between the undisturbed ground and the fitting to be anchored; plastic sheathing to be placed between the concrete and fitting. The bearing surface shall be as shown or as directed by the Engineer. Place the blocking so that the pipe and fitting joints will be accessible to repairs, unless otherwise shown.

3. Metal Tie Rods

Metal tie rods, if specifically required by the Plans or the Engineer, shall be used in conjunction with thrust block. The rods, nuts and washers shall be coated with a rust resistant coating. (A product intended for such use.)

20.6 Pipe Testing and T. V. Inspection

A. ~~Sanitary Sewer Pipe. The final test shall be conducted by the Contractor, under the supervision of the Engineer, or his/her representative, after the sewer line is backfilled. The Contractor shall notify the Engineer at least twenty-four (24) hours in advance of his/her intention to pressure test the line.~~

Sanitary Sewer Pipe Testing and CCTV inspection shall be per ISPWC Division 500 and performed by the contractor.

~~All wyes, tees, and stubs shall be securely fastened to manholes and the internal test pressure. Such plugs or caps shall be readily removable, and their removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.~~

~~Exfiltration testing of the sanitary sewer pipe will be conducted by the Contractor, under the supervision of the Engineer, or his/her representative, after the sewer line is backfilled. The Contractor shall notify the Engineer at least twenty-four (24) hours in advance of his/her intention to pressure test the line.~~

~~If the test indicates that there is excessive leakage in the line the Contractor shall make repairs, at his/her own expense, and take such corrective action as may be required by the Engineer.~~

~~T.V. inspection of the sanitary and storm sewer pipe will be conducted by the City after the pipe has been backfilled and the manholes are accessible.~~

1. Exfiltration Test (Using Air)

The Contractor shall plug all openings in the pipe and supply necessary metering equipment and hoses for the test and a blower or compressor with adequate capacity to perform the test.

Immediately following the pipe cleaning, the pipe installation shall be tested with low pressure air. Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches four (4) pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe as determined by the Engineer.

At least two minutes shall be allowed for temperature stabilization before proceeding further. The inspector will then accurately determine the time of loss of one (1) psi. This time interval shall not be less than the time interval determined in the following formula.

$$T = 0.0109 D^2 L$$

T = time in seconds

D = nominal inside diameter of pipe in inches

L = length of pipe in feet

Failure to meet or exceed the computed time interval for the loss of one (1) psi will be cause for rejection of the sewer pipe.

All repairs necessary to meet these requirements and/or testing will be at the expense of the Contractor.

The maximum length of sewer pipe, for the above tests, shall be the distance between consecutive manholes. Any section of sewer pipe, between any two manholes that does not meet the above requirements, shall be rejected.

2. T.V. Inspection

T.V. inspection, (by the pipes will be required, p roadway. It shall be the ample advance notice o assure the timely scheduling of the City's personnel and equipment.

Sanitary Sewer Pipe Testing and CCTV inspection shall be per ISPWC Division 500 and performed by the contractor.

Any and all imperfections (i.e. sags in the pipe invert, joints not fully seated, offset joints, poor manhole entries and exits, etc.) found in the installation of the pipe shall be immediately repaired by the Contractor at no cost to the City. Such repairs shall be as allowed and directed by the City Engineer.

B. Water Pipe

All new watermain shall pass City standard pressure testing and bacteriological testing. Pressure testing, flushing, disinfection, and bacteriological testing shall be performed by the City Water Department. All testing, flushing, and disinfecting materials and labor costs of the City's must be paid by the Contractor. It is the Contractor's responsibility to repair all leaks. The test pressure shall be 1-½ times the working pressure of the pipe per AWWA standards. The bacteriological test criteria shall be as follows: one test showing "absence" of coliform bacteria (<1) and a standard plate count of less than 100. The Contractor shall be responsible for all excavation and back fill necessary to allow the City Water Department access to the new main for the City to furnish, install, and remove all corporation stops necessary to test, chlorinate, and bacteriological sample the new main as required. This includes backfill and trench surfacing once and then returning to the site to re-excavate and re-backfill (including cold mix patching) any corporation stops that remain in the main during disinfecting and sampling procedure. Where connections are made to existing mains the fitting and pipe shall be thoroughly cleaned and spray disinfected with 150(+) ppm chlorine solution immediately prior to their installation and such procedure shall be witnessed by a representative of the City; such operations by the contractor require the City to be notified a minimum of 48 hours in advance. The 48 hour notice is necessary to allow the City crew to notify customers of the water outage. The contractor shall be responsible for coordinating and cooperating with the City Water Department for testing, flushing, and disinfecting activities.

20.7 Plugging Existing Pipe

Where shown in the Plans or where designated by the Engineer, existing pipes shall be plugged on the inlet end for a distance of 2 diameters with commercial concrete. Care shall be used in placing the concrete in the pipe to see that the opening of the pipe is completely filled and thoroughly plugged.

20.8 Basis of Payment

Payment shall be as described in Section 01025

- A. ~~Storm Sewer Pipe. The accepted quantities of storm sewer pipe will be paid for by the unit price per linear foot and shall include all costs incidental to furnishing and laying pipe, as herein described, including furnishing and installing lock bands at each joint and all pipe zone material.~~
- B. ~~Sanitary Sewer Pipe. The accepted quantities of sanitary sewer pipe will be paid for by the unit price per linear foot and shall include all costs incidental to furnishing and laying pipe. The cost of furnishing all pipe zone material is also included in this item.~~
- C. ~~Perforated Sub-surface Drain Pipe. The accepted quantities of subsurface drain pipe will be paid for by the unit price per linear foot and shall include all costs incidental to furnishing and laying pipe, as herein described, including all angle branches, plugs, pipe connectors, and all pipe zone material.~~

- D. Water Pipe & Ductile Iron Fittings. Payment for main line water pipe, including fittings, thrust blocks and couplings will be made at the unit price per linear foot.
- E. Plugging existing pipes will be measured per each, for each plug installed, for pipe diameters up to and including 36 inches. The concrete for plugging pipes in excess of 36 inches in diameter will be measured by the cubic yard. Computations for corrugated metal pipes will be based on the nominal diameter.

The measurement for payment will be the field measured centerline length of the pipe in place within the limits shown. Laying lengths of valves, fittings and couplings will be included. Payment for fittings, couplings and thrust blocks shall be considered incidental to the cost of the respectively-sized pipe.

Payment for valves will be made at a per each unit price.

ES-21 GATE VALVES AND VALVE BOXES

21.1 Scope

This section covers the work necessary for furnishing and installing the gate valves and valve boxes, complete.

21.2 Materials

- A. Gate Valves (all sizes). Valves shall be ductile iron AMERICAN FLOW CONTROL SERIES 2500 resilient seated valves, or an approved equal, and shall open when the stem is rotated counterclockwise. Unless otherwise shown, valves shall have 2-inch square wrench nut. Valve ends and valve sizes shall be shown. Valves shall conform to ANSI / AWWA C-509.
- B. Valve Boxes. Valve boxes for valves 12" in size and smaller shall be Buffalo 2-piece slip - type, cast iron with 5-1/4 inch shaft, and shall be TYLER 6855 series of appropriate length for the installation, or approved equal. Valve boxes for valves over 12" in size shall be Buffalo 3-piece sliding type cast iron with 5-1/4 inch shaft and shall be TYLER 6855 series of appropriate length for the installation or approved equal. The word "Water" shall be cast into the top of the lids. Extension pieces, if required, shall be the manufacturer's standard type for use with the valve boxes.
- C. Extension stems for valve operators. Where the depth of the opening nut is more than 4.5 feet, standard operating extensions shall be provided to bring the operating nut to a point 3.5 feet below the surface of the ground or pavement. The extension stem shall be constructed of steel (and coated).

21.3 Workmanship

D. A valve "Box-Loc" is to be installed to center the operating nut with the lower valve can.

- A. Valves. Before installation, the valves shall be thoroughly cleaned of all foreign material, and shall be inspected for proper operation for both opening and closing, and to verify that the valves seat properly. Valves shall be installed so that the stems are vertical, unless otherwise directed by the Engineer. Jointing shall conform to AWWA C-600 or AWWA C-603, whichever is applicable. Valves shall be installed in accordance with "Standard Details". Joints shall be tested with the adjacent pipeline. If joints leak during the test, valves shall be disconnected and reconnected, and the valve and/or the pipeline retested.

← The bolts should be checked for tightness.

Faces of flanges shall be cleaned thoroughly before flanged joint is assembled. After cleaning, the gasket shall be inserted and the nuts tightened uniformly around the flange. If flanges leak under test, the nuts shall be loosened, the gasket reset or replaced, the nuts retightened, and the valve and/or pipeline retested.

Valves on all service connections and stubouts, 4 inch and larger, shall be mechanical joint and shall be restrained with coated tie rods.

← Centering device "Box-Loc"

- B. Valve Boxes. Center the valve boxes and set plumb over the wrench nuts of the valves. Set valve boxes so that they do not transmit shock or stress to the valves. Set the valve box covers flush with the surface of the finished pavement as shown, or such other level as may be ordered by the Engineer. Cut extensions to the proper length so that the valve box does not ride on the extension when set at grade.

Backfill shall be the same as specified for the adjacent pipe. Place backfill around the valve boxes and thoroughly compact to a density equal to that specified for the adjacent trench and in such a manner that will not damage or displace the valve box from proper alignment or grade. Misaligned valve boxes shall be excavated, plumbed, and backfilled at the Contractor's expense.

Valve boxes shall be clean prior to final project acceptance

← and accessible with key for unhindered operation.

21.4 Payment

Payment shall be as described in Section 01025

~~Payment for gate valves furnished and installed, complete, with valve boxes will be by the unit prices per each. Payment for the gate valves and valve boxes shall constitute full compensation for the work as specified under this section.~~

~~Payment for gate valves and valve boxes furnished and installed as auxiliary valves on hydrants shall be included in the unit price for hydrants.~~

ES-22. FIRE HYDRANTS

22.1 Scope

This section covers the work necessary for furnishing and installing the fire hydrants, complete, and the work necessary for the removal of existing hydrants.

22.2 Materials

- A. Low Pressure Hydrants. Hydrants to be corey pattern with nominal 5-1/4 inch main valve opening with 6 inch bottom connections. Equip with two 2-1/2 inch hose nozzles and one 4-1/2 inch pumper port with a 5 inch Storz hose nozzle. The Storz nozzle shall be an integral part of the fire hydrant and must be furnished by the manufacturer or authorized distributor designated by the manufacturer. Storz adapters will not be accepted. Operating nut shall be equipped with O-ring seals and shall open when turned to the left or counterclockwise. Hydrants shall be of the break-flange or safety-top type. Hydrants shall conform to AWWA C-502, and these Specifications. The depth of bury will generally be 5 feet; and as required to accommodate site conditions. Nozzle threads shall be American National Standard. The hydrant isolation valve shall be attached to the tee at the main and all of the piping shall be restrained from the tee to the hydrant with flanged fittings, retaining glands (mega lugs, etc.) or tie rods as approved by the City Engineer. Hydrants shall be factory painted or may be painted by the contractor using a high quality industrial enamel high intensity red paint above the ground line; spray can paint will not be allowed.
- B. Manufacturer, "Model": Waterous, "Pacer" or Mueller, "Centurian"
- C. Base Block. Solid precast concrete pier block having nominal dimensions of 8-inch thickness by 15-inch square base.
- D. Drain Rock. Washed 1-1/2 inch crushed rock or graded river gravel free of organic matter, sand, loam, clay, and other small particles that will tend to restrict water flow through the gravel.
- E. Concrete for Thrust Blocking. City Standard per ES-11 CONCRETE.
- F. Thrust Ties. 3/4 inch diameter steel rods and duc-lugs as manufactured by Stellar Corporation, Columbus, Ohio, or approved equal. Rods shall have rust resistant protective coating.
- G. Auxillary Gate Valve. See City Standard ES-21 GATE VALVES AND VALVE BOXES.

22.3 Workmanship

Construction and installation shall conform to the detail on the Plans and to provisions of Sections 11 and 12 of AWWA C-600, except where otherwise specified.

- A. Location and Position. Locate as shown or directed so as to provide complete accessibility and minimize possibility of damage from vehicles or injury to pedestrians. A 3-foot clear space shall be provided and maintained around the circumference of the hydrant or as approved by the Engineer. Where hydrants are subject to impact by a motor vehicle, guard posts other approved means shall be provided as approved by the Engineer. Improperly located hydrants shall be disconnected and relocated, at the Contractor's expense.

When placed behind the curb, set hydrant barrel so that the face of the pumper or hose nozzle cap will be 2 feet from the back of the curb. When set in lawn space between curb and sidewalk, or between sidewalk and property line, let no portion of the hydrant or nozzle cap be within 12 inches of the sidewalk.

Set all hydrants plumb and nozzles parallel with, or at right angles to the curb, with the pumper nozzle facing the curb. Set hydrants so that safety flange is a minimum of 3 inches and maximum of 6 inches above finished ground or sidewalk level to clear bolts and nuts, and as directed.

- B. Excavation. Do not carry below sub-base grade. Replace over-excavated areas with gravel, and hand tamp to provide firm foundation.
- C. Base Block. Place on firm level sub-base to assure uniform support.
- D. Installation of Hydrants. Place hydrant carefully on base block to prevent the base block from breaking. After hydrant is in place and connected to the pipeline, place temporary blocks to maintain the hydrant in a plumb position during subsequent work.
- E. Drain Rock. Place gravel around base block and hydrant bottom after hydrant has been blocked in place. Drain gravel shall be not less than 6 inches above hydrant drain opening. Do not connect drainage system to sewer.
- F. Concrete Thrust Blocking. Place after hydrant is blocked in its final position and hydrant is joined to pipe. Concrete thrust block shall have a minimum of 4 square feet of bearing area against undisturbed earth. Restraint devices such as flanged fitting, mega lugs, or tie rods may be used in lieu of thrust blocks if approved by the City Engineer.
- G. Bury Depth and Thrust Ties. The ground surface around fire hydrants shall be as follows:
 - 1. Behind the hydrant: The ground surface shall be a minimum of 4.5 feet above the hydrant base (as measured from 'level') for a distance of at least 10 feet behind the back of the hydrant. The City Engineer may approve a lesser bury requirement if thrust ties consisting of two $\frac{3}{4}$ inch coated steel tie rods connecting

the hydrant to the valve and the main are utilized. All earthen fill behind hydrants for a minimum distance of 10 feet shall be compacted full depth to a minimum of 95% of AASHTO T99 proctor value.

2. Sides of the hydrant: The ground surface shall be a minimum of 4.5 feet above the hydrant base (as measured from 'level') for a distance of at least 6 feet from the centerline of the hydrant barrel. All earthen fill at the sides of the hydrant for a minimum distance of 6 feet shall be compacted full depth to a minimum of 95% of AASHTO T99 proctor value.
3. Front of the hydrant (towards the main): 4.0 foot minimum cover over the hydrant lateral pipe shall be maintained – as shown on the City of Moscow Standard Construction Drawings.

~~Payment for existing fire hydrants shall be as described in Section 01025 and on the plans.~~

Payment shall be as described in Section 01025

~~ce stated in the
n and on the plans.~~

- H. Existing Fire Hydrant Removal. Remove fire hydrants on existing city mains as shown on the plans and as directed by the Engineer. The hydrants shall remain the property of the City of Moscow and shall be stockpiled, for the City, at a location to be determined. Care shall be taken so as not to damage the hydrants during removal, transporting, or stockpiling.

22.4 Payment

Payment shall be as described in Section 01025

~~Payment for fire hydrants furnished and installed will be by unit price per each. Payment for fire hydrants shall constitute full compensation for all work specified under this section, and shall include the auxiliary gate valve and connecting pipe from the main line to the valve, and all trench excavation and backfill from the main to the hydrant.~~

~~Payment for existing fire hydrant removal will be made at the per each unit price~~

ES-23. STORM AND SANITARY CONNECTIONS

23.1 Materials

- A. Sewer house connections, where required on the plans or ordered by the Engineer, shall be a minimum of four (4) inch diameter pipe. The pipe shall conform to Specification ES-8.2, Sanitary Sewer Pipe, except that it shall be green in color.
- B. Pipe zone material, unless otherwise specified, shall be 3/4 inch minus crushed rock, pea gravel, or clean sand.

23.2 Workmanship

- A. The sewer house connections shall be branched from the main sewer line by a Y branch on new mains; by a ROMAC style "CB" saddle on existing sewer mains. Branches shall

be placed where indicated on the plans or as ordered by the Engineer, and shall be installed, at a point, above the centerline of the sanitary sewer main.

- B. ROMAC style "CB" saddles shall be furnished and installed by the City and paid for by the contractor.
- C. Sanitary sewer services shall not be connected to manholes.
- D. Maximum deflection permissible with any one fitting shall not exceed 45 degrees and shall be accomplished with long-radius curves or bends. Short-radius elbows or curves will not be permitted except by approval of the Engineer.
- E. Provide ends of all sewer house connection lines with standard watertight plugs, suitably braced to prevent blowoff during internal hydrostatic or air testing. With all plugs in place, test the sanitary sewer lines in accordance with ES-20.6, Pipe Testing and T.V. Inspection.
- F. After the line has been tested by the Contractor and accepted by the Engineer, the Contractor shall furnish and install an approved marker, as per City of Moscow Standard Drawings, to identify the ends of the sewer stubs. The marker shall be wrapped with detectable sewer tape.
- G. Conform to applicable portions of Section ES-19 Trench Excavation and Backfill and Section ES-20.2 Sanitary Sewer Pipe.
- H. Backfill the pipe zone with granular pipe zone material, hand-placed simultaneously on both sides of the pipe for the full trench width and hand-tamped with approved tamping bars supplemented by 'walking in' and slicing with a shovel.
- I. Backfill, above the pipe zone, shall conform to applicable portions of Section ES-19 Trench Excavation and Backfill. Do not backfill sewer house connection pipe until inspected and approved by the Engineer.
- J. All denuded areas shall be fertilized, re-sown with grass seed and covered with mulch as specified in Sections ES-27 and ES-28.
- K. Install as per the Standard Construction Drawings.
- L. Separation of storm and sanitary sewer service laterals from water mains and water service lines shall conform to the requirements of Idaho Drinking Water Standards.

23.3 Basis of Payment

Payment shall be as described in Section 01025

- ~~A. Trench excavation and backfill, required under this item, will be paid for as incidental to the price per linear foot of pipe stated in the Contractor's bid proposal. Payment for that~~

Payment shall be as described in Section
01025

item shall constitute full compensation for all work connected with excavation and backfill.

- B. Sewer house connection pipe, in place, will be paid for on the unit price per linear foot for the appropriate size of pipe stated in the Contractor's bid proposal. Payment for this item shall constitute full compensation for all materials and work required to install the sewer house connection pipe, complete, including trench excavation and backfill. The length of the house connection will be based on the total length of pipe installed, including all fittings, measured along the pipe center line.

ES-24. STREET / ALLEY CUT REPAIR

All excavations in to existing City street paving shall be repaired in accordance with the City's adopted STREET / ALLEY CUT REPAIR policy and as per Standard Construction Drawing entitled STREET /ALLEY CUT REPAIR.

ES-25. EROSION AND SEDIMENT CONTROL

All construction in the City involving earthwork shall comply with all of the requirements of City Code Section 7-1-4 pertaining to Erosion and Sediment Control and the City of Moscow EROSION AND SEDIMENT CONTROL STANDARDS adopted by resolution.

The Contractor shall implement appropriate erosion control eliminating sediment transport to City infra-structure and private property. The Contractor shall pay all costs associated with sediment removal from City infra-structure, private property or environmental remediation.

All sediment control devices shall be installed prior to any ground disturbing activity.

ES-26 STORMWATER RUNOFF CONTROL

All construction and development activity in the City shall comply with all of the requirements of City Code Section 5-15 STORMWATER RUNOFF CONTROL and including Moscow STORMWATER RUNOFF CONTROL STANDARDS adopted by resolution.

ES-27. IMPORTED TOPSOIL

27.1 General

Imported topsoil shall possess friability and a high degree of fertility. It shall be free of clods, roots, gravel and other inert material. It shall be free of quack grass, horsetail and other noxious vegetation and seed. Should such regenerative material be present in the soil, it shall be the responsibility of the Contractor to remove all such growth, both surface and root, which may appear in the planting within one year following acceptance of the job at his/her own expense and in a manner satisfactory to the Owner.

27.2 Payment

Payment shall be as described in Section 01025

~~Payment for furnishing and placing imported topsoil shall be paid according to the unit price bid on the Contractor's bid proposal form or as noted as set forth in the Contract documents.~~

ES-28. SEEDING, SOD, AND INFIELD SURFACE RESTORATION

28.1 Seed

Seed furnished shall be labeled; true as to variety; noxious weed-free; and meet all purity, germination specifications, and standards of the Federal Seed Act and Idaho State Seed Laws.

~~The variety shall be as required to best satisfy the particular application as approved by the City Engineer.~~

The variety shall be as specified, submitted to and approved for use.

28.2 Application

Seed all cut and fill slopes and all other denuded areas where any earthwork has occurred. Seeding shall be done in accordance with Section 621 of the latest edition of the Idaho Transportation Department Standard Specifications for Highway Construction, including all amendments thereto.

28.3 Fertilizer

Fertilizer shall be commercial grade and used in the seeding application in accordance with Section 621 of the latest edition of the Idaho Transportation Department Standard Specifications for Highway Construction, including all amendments thereto.

28.4 Mulch

Mulch shall be used in the seeding operation and shall consist of furnishing and placing mulch in accordance with Section 621 of the latest edition of the Idaho Transportation Department Standard Specifications for Highway Construction, including all amendments thereto.

28.5 Seedbed Preparation

Preparing the surface area to be seeded is part of the seeding operation and shall be done in accordance with Section 621 of the latest edition of the Idaho Transportation Department Standard Specifications for Highway Construction, including all amendments thereto.

28.5 Seed Variety

Paradise Creek Impact Zone shall be as follows:

As required on the ACOE drawings "Design-Build Restoration of Paradise Creek Ecosystem - Moscow Idaho" Drawings located in Appendix C.

28.6 Ghormley Park Sod Surface Restoration

All Ghormley Park Grass shall be restored with Sod and shall be turf bluegrass mix similar to the following seed mix:

Option A - "Ideal Turf Mix" and can be found at Spence Hardware in Moscow which has the following mix design:

- 20% Kentucky Bluegrass
- 20% Rockstar Bluegrass
- 20% Wildhorse Kentucky Bluegrass
- 10% Ryegrass seed - Excadia 2
- 10% Ryegrass seed - Medallion
- 10% Ryegrass seed - Manhattan
- 10% Red Fescue

Option B - "Basin Sod Mix" manufactured by Basin Sod

- 39.05% Midnight Kentucky Bluegrass
- 14.88% Blueberry Kentucky Bluegrass
- 37.40% Full Moon Kentucky Bluegrass
- 3.47% Protege GLR Perennial Ryegrass
- 3.43% Manhattan 5 GLR Perennial Ryegrass

28.7 Ghormley Park Softball Field - Infield Dressing Surface Restoration

All infield surface restoration shall be 4-inches of Hess Pumice Products Malad ID, 1/8-inch fine

28.6 Payment

Payment shall be as described in Section 01025

~~Seeding will be paid for specific contract documents; which may include, but not limited to, the following methods of payment: unit price per unit area; lump sum amount; incidental to other item unit prices; included in a project lump sum amount.~~

ES-29. TREE TRIMMING

Any tree, within the construction area, whose branches, trunk or roots must be removed in order to complete the work, should be trimmed, as directed by the Engineer. All costs for such trimming shall be noted as set forth in the Contract documents. **ALL TREE TRIMMING SHALL CONFORM TO THE APPLICABLE SECTIONS OF THE COMMUNITY FORESTRY ORDINANCE.**

ES-30. INSPECTION

Work performed under this contract shall be inspected at various stages of progress. These inspections include, but shall not be limited to the following:

- A. After storm sewer lines, sanitary sewer lines, perforated drain lines and their structures are in place, but before any backfilling is started.
- B. Prior to and during the placement of all concrete. This inspection shall be requested when the forms are in place and ready to receive the concrete.
- C. After the street has been excavated and compacted, but before any crushed rock is placed.
- D. During the application and processing of the crushed rock base and after the crushed rock base has been placed and compacted, but before the prime coat is applied.
- E. After valve boxes, catch basins, manholes and monuments have been adjusted to the proper elevation.
- F. Prior to and during the placement of prime coat and tack coat.
- G. Prior to and during the placement of all superpave hot mix asphalt pavement.
- H. At the completion of the job, after all cleanup, backfilling and all other work is done and job is ready for final acceptance.

It shall be the responsibility of the Contractor to notify the Engineer, or his/her representative, when the various phases of the project are ready for inspection.

Request for inspection may be verbal but shall be given in sufficient time to allow the Engineer, or his/her representative, to arrange to be present as required. Failure to notify the Engineer, or his/her representative, of the inspections shall be sufficient ground to reject the uninspected work and cause its immediate removal.

All discrepancies, indicated by the inspector, shall be corrected by the Contractor and re-inspected before the next phase of operation is started. No claim shall be made for delays caused by correction of work found unacceptable to the inspector.

ES-31. WORKMANSHIP AND CLEAN UP

It is the intent and purpose of these Specifications and Plans to obtain good workmanship throughout with the completed work complying with the said Specifications and Plans and in full working order upon completion. Work will not be accepted until this result is obtained.

All debris or rubbish caused by the contractor's operations shall be removed and the areas occupied during such operation shall be left in a neat and presentable condition.

Any damage to private property shall be repaired, replaced in kind, as approved by the City Engineer or the Owner compensated as required by the General Specifications.

Upon the satisfactory completion of all work embraced in the contract and specifications, including the cleanup, together with full compliance with the requirements of the General Specifications the Engineer will, within fifteen (15) days after such completion and compliance, issue a certificate of completion to the Owner with two (2) copies to the Contractor.

ES-32. MOBILIZATION

This item shall consist of preparatory work and operations, including but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site; for the establishment of offices, buildings and other facilities necessary for the work on the project; for premiums on bond and insurance for the project; for all other work and operations which must be performed or costs incurred before beginning production work on the various contract items. Mobilization cost for subcontracted work shall be considered to be included in the prices bid by the prime Contractor.

~~The amounts to be allowed for mobilization shall be as follows:~~ Payment shall be as described in Section 01025 ~~made under the contract~~

- ~~1. Sixty percent of the amount bid for mobilization will be paid on the first monthly progress estimate.~~
- ~~2. Forty percent of the amount bid for mobilization will be paid on the second monthly estimate providing that the contractor has initiated productive work on the project.~~

~~Mobilization will be measured
Proposal~~

Payment shall be as described in Section
01025

~~on the Contractor's~~

APPROVED BY MOSCOW CITY COUNCIL
APRIL 7, 2014, RESOLUTION 2014-06



STANDARD CONSTRUCTION DRAWINGS

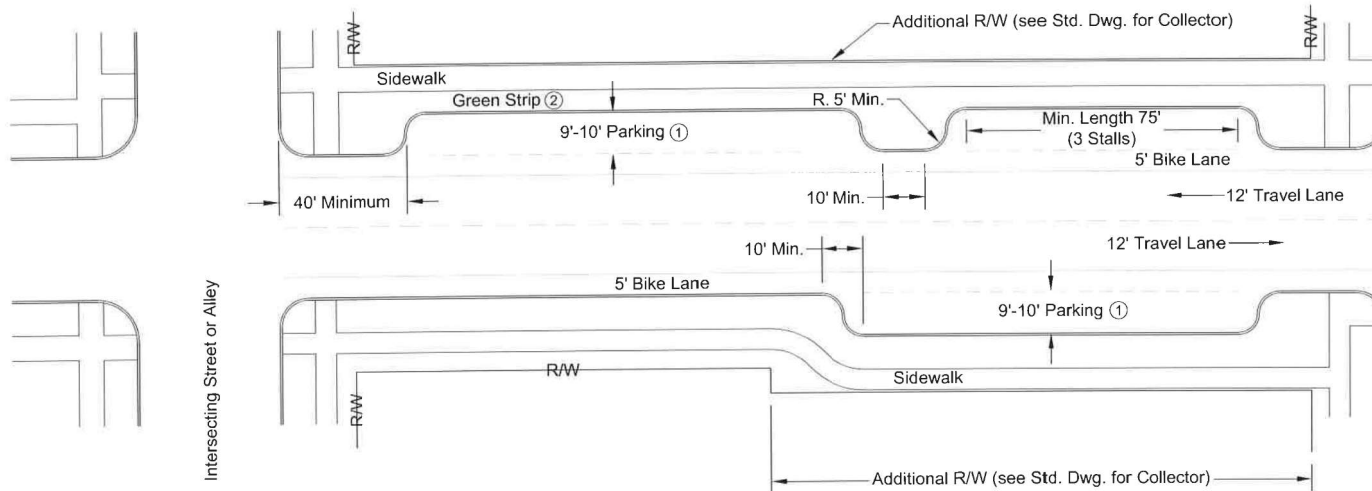
PUBLIC WORKS
ENGINEERING DEPT.
221 E. SECOND ST.
(208) 883-7034

"CALL BEFORE YOU DIG" 811

STANDARD CONSTRUCTION DRAWINGS TABLE OF CONTENTS

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A.S.T.M.	AMERICAN SOCIETY FOR TESTING & MATERIALS	JT.	JOINT		AGGREGATE		METAL
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS	MECH.	MECHANICAL				
A.D.A.	AMERICAN DISABILITIES ACT	M.J.	MECHANICAL JOINT		CONCRETE	NOTE: ② CIRCLED NUMBERS HEREIN THESE STANDARDS INDICATE A NOTE REFERENCE	
AGGR.	AGGREGATE	MUTCD	MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES				
C.I.	CAST IRON	O/C	ON CENTER		EARTH		
CL.	CLASS	OSHA	OCCUPATIONAL AND SAFETY HAZARD ASSOCIATION				
CMP.	CORRUGATED METAL PIPE	R	RADIUS		PAVEMENT		
COMP.	COMPACTED or COMPACTION	R/W	RIGHT-OF-WAY				
CONC.	CONCRETE	SPEC.	SPECIFICATION				
D.I.	DUCTILE IRON	STA.	STATION				
DIA.	DIAMETER	SL.	SLOPE				
I.D.	INSIDE DIAMETER	THK.	THICK				
FLG.	FLANGE	TYP.	TYPICAL				
G.V.	GATE VALVE	WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION				



Notes:

1. Parking on Collector streets shall be a minimum of nine feet (9') wide in Residential zones and ten feet (10') wide in Commercial and Industrial zones.
2. The green strip may be narrowed to a minimum width of five feet (5') in areas of excessive cuts and fills, as approve by the City Engineer.

REVISIONS	
DATE	DESCRIPTION

DRAFTED BY: C. Edwards	CHECKED BY: K. Lilly	DRAWING SCALE: NTS	DATE: 2-25-2014
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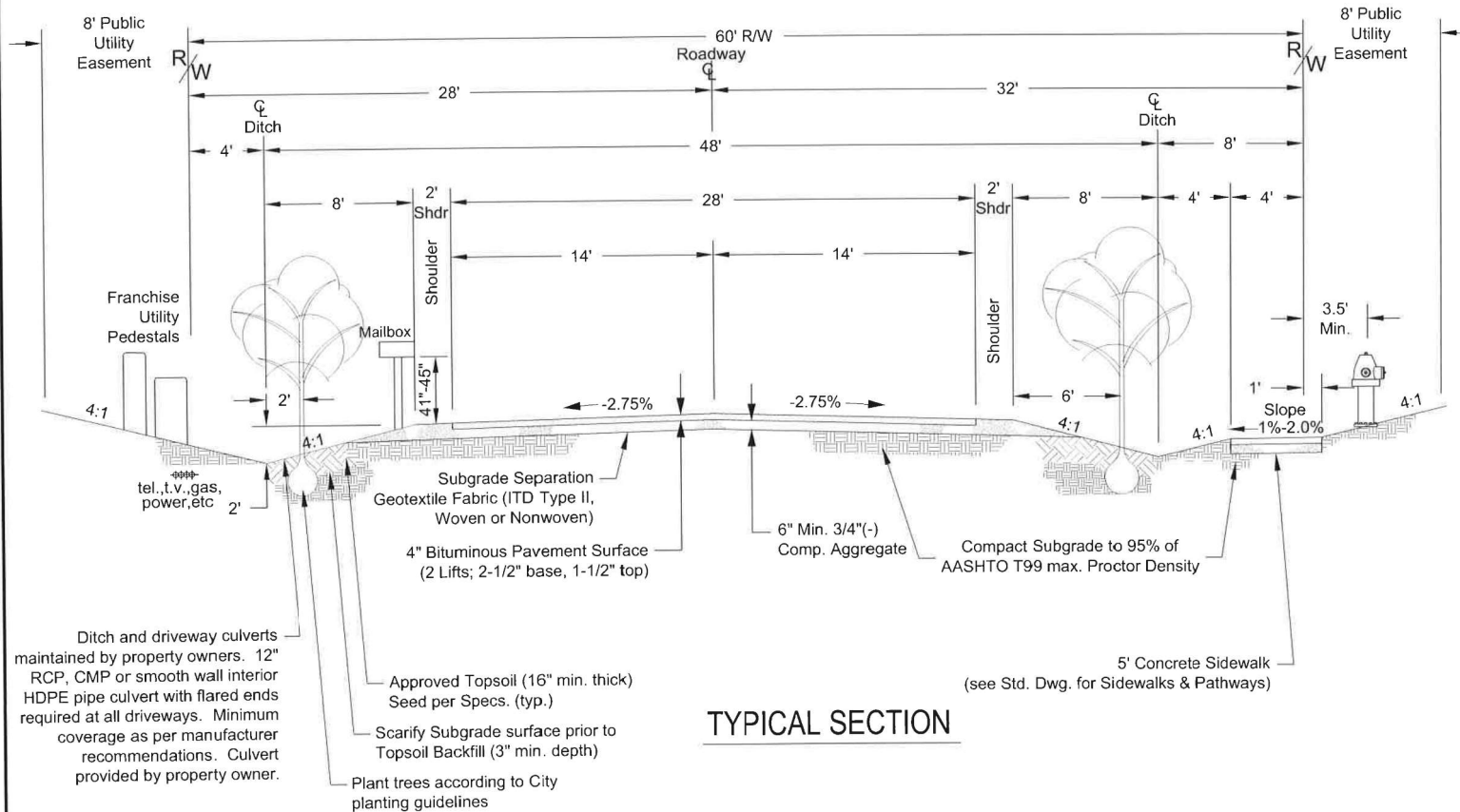
Collector Parking Detail

CITY OF MOSCOW
ENGINEERING DEPARTMENT

DRAWING NUMBER:
1e

NOTES:

1. No parking allowed on either side of street.
2. Use of this street standard shall be limited to areas with low potential for "pass through" traffic and shall not conflict with or hinder the public street system configuration and logical extensions.



TYPICAL SECTION

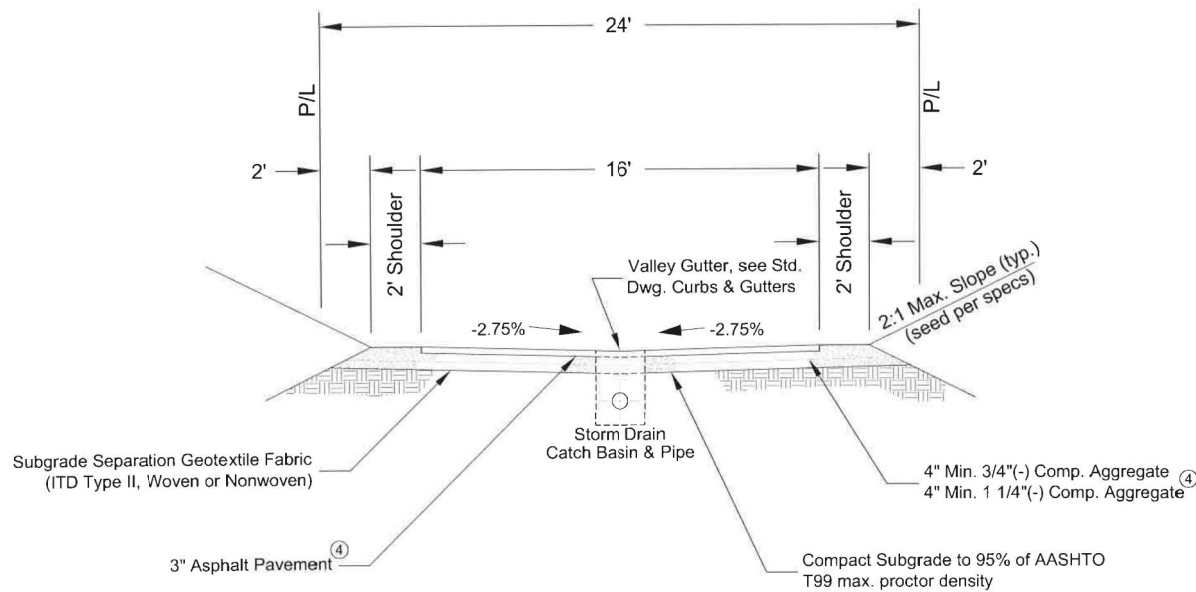
REVISIONS	
DATE	DESCRIPTION

SIGNED AND DATED	
DRAFTED BY:	K. Kipp / C. Edwards
CHECKED BY:	K. Lilly
DRAWING SCALE:	NTS
DATE:	2-26-2014

LARGE LOT SUBDIVISION STREET STANDARD	CITY OF MOSCOW ENGINEERING DEPARTMENT
DRAWING NUMBER:	
1h	

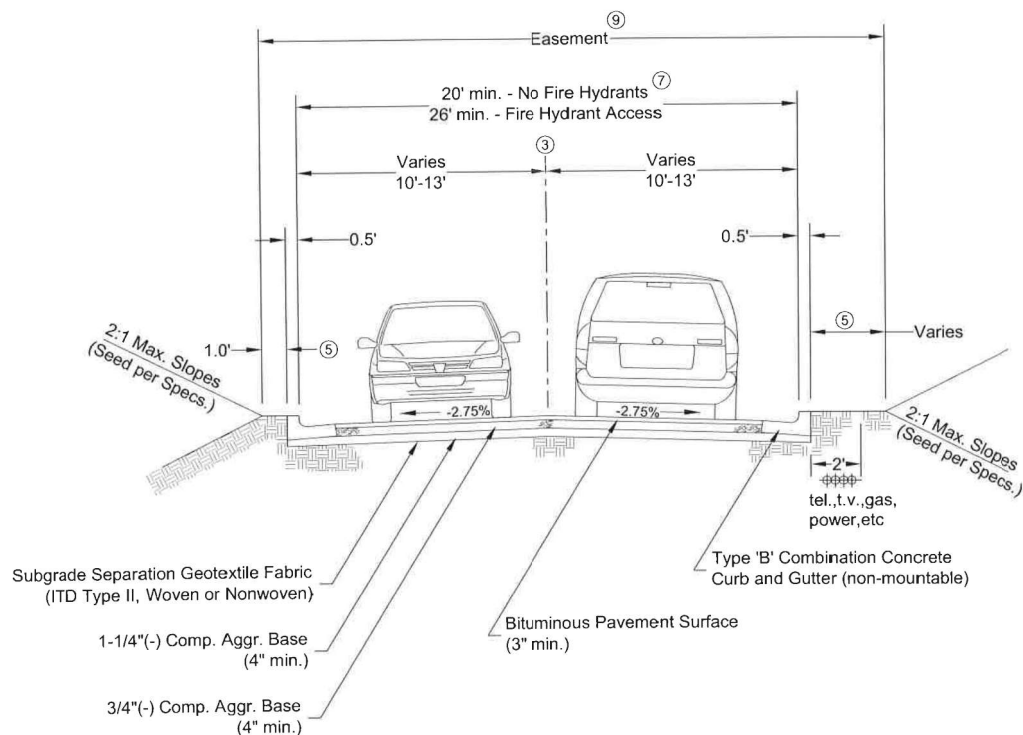
NOTES:

1. No parking allowed on either side of alley.
2. "No Parking in Alley" signage to be installed by developer in accordance with MUTCD and City Specifications if required by City Engineer.
3. Drainage system required as approved by the City Engineer.
4. Geotechnical Engineering assessment of soil conditions may be required by City Engineer to determine if additional asphalt pavement and aggregate base depth will be required.
5. Truncated domes are required at sidewalk crossings of public alleys.



TYPICAL SECTION

REVISIONS	DESCRIPTION	
	DATE	
SIGNED AND DATED		
DRAFTED BY:	C. Edwards	
CHECKED BY:	K. Lilly	
DRAWING SCALE:	NTS	
DATE:	3-5-2014	
PUBLIC ALLEY CITY OF MOSCOW ENGINEERING DEPARTMENT		
DRAWING NUMBER: 2		



NOTES:

1. Compact all subgrade and aggregate base to 95% of AASHTO T99 max. proctor density.
2. Seed all roadside backfill and excavations as per specifications.
3. Maximum centerline profile grade equals 10.0% or as approved by the City Engineer. Additional easements may be required as necessary.
4. Subgrade underdrain systems are required in inherently "wet" areas, as specified by the Engineer.
5. This dimension shall be four feet (4') where standard franchise utility pedestals (no transformers) are to be located and shall be six feet (6') where pedestals and an AVISTA power transformer pad is required (see Standard Drawing for Franchise Utility Details).
6. Sidewalks, vehicular cuts/approaches, and pedestrian drops shall comply with City Standards where required and installed.
7. Designated fire lanes shall be signed for no parking and curbs (if present) shall be painted yellow. Additional width may be required for Fire Department access.
8. Gates shall not be permitted.
9. Public utility and franchise utility easements shall be provided per City Standards for utilities within the roadway area.
10. Private streets shall be limited in use to Planned Unit Developments (PUD) and shall not conflict with or hinder the public street system configuration and logical extensions. Private streets shall not promote "pass through" traffic between public streets.
11. Sidewalks or other pedestrian pathways shall be installed if required by the PUD process and shall be a minimum of five feet (5') in width.
12. City shall not provide any maintenance, repair, or snow removal on private streets.
13. A street light shall be installed at each intersection of a private street with a public street per the Residential Street Lighting Standard Drawing.
14. Vertical and horizontal alignment of private streets shall meet the requirements for Fire Department access as per the International Fire Code.

REVISIONS	
DATE	DESCRIPTION

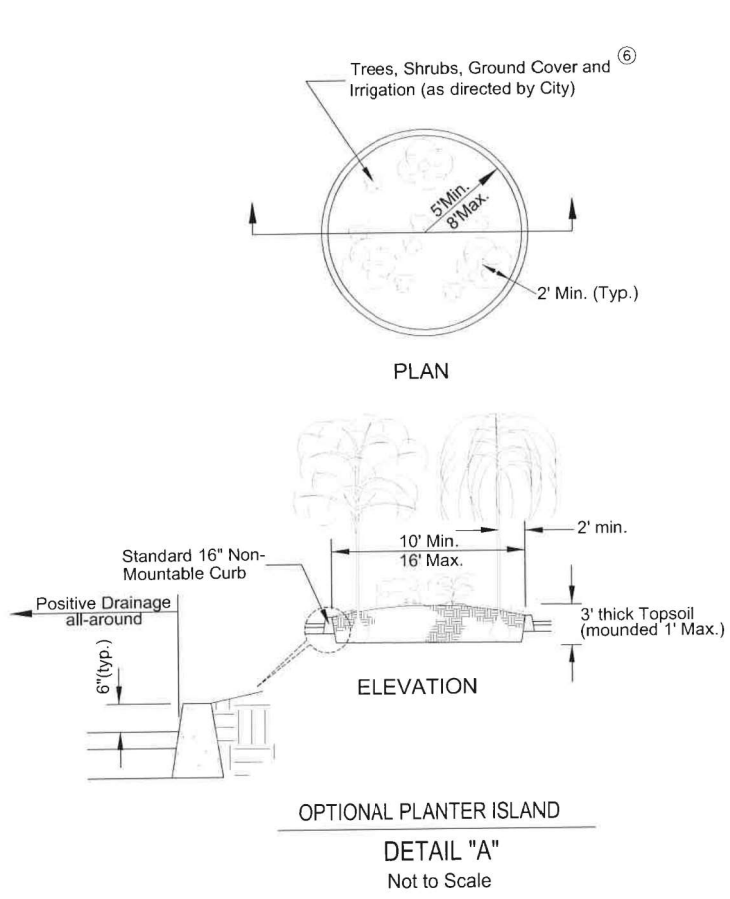
DRAFTED BY: C. Edwards	CHECKED BY: K. Lilly	DRAWING SCALE: NTS	DATE: 2-26-2014
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PRIVATE STREETS

CITY OF MOSCOW
 ENGINEERING DEPARTMENT

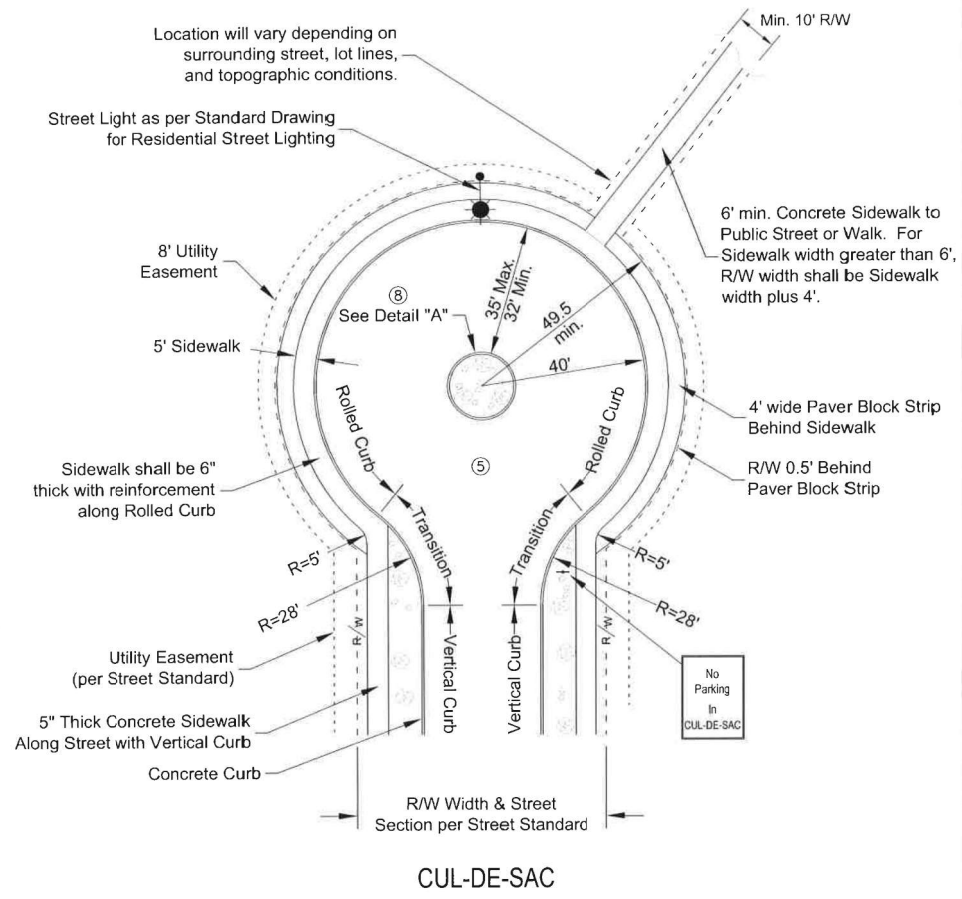
DRAWING NUMBER:

3



NOTES:

1. Use of cul-de-sac and 'dead end' streets shall be limited to promote street connectivity and emergency vehicle access. Cul-de-sacs shall only be allowed when topographic conditions or other factors prohibit reasonable extension of the street.
2. Center cul-de-sacs and turnarounds in platted right-of-way unless otherwise approved by the City Engineer.
3. All signs to be furnished and installed by 'Developer'. Signs and installation to be in accordance with MUTCD and City Specifications.
4. Tree selection and planting shall comply with the City's Arboricultural Standards and Specification Guide.



5. All cul-de-sacs to be constructed with a minimum of 1.0% sloping surface to drain.
6. All curb radii dimensions are measured as per the Standard Drawing for Curbs.
7. Seed all cut/fill slopes and green strips per city specifications.
8. Installation of optional Planter Island as per approval by the City Engineer.
9. 'Not A Through Street' sign required at the entrance of cul-de-sac streets.
10. No utility poles, lights standards, mailboxes, fire hydrants, or other vertical features allowed in sidewalk or paver block strip within cul-de-sac.
11. Geotechnical Engineering assessment of soil conditions may be required by City Engineer to determine if additional asphalt pavement and aggregate base depth will be required.

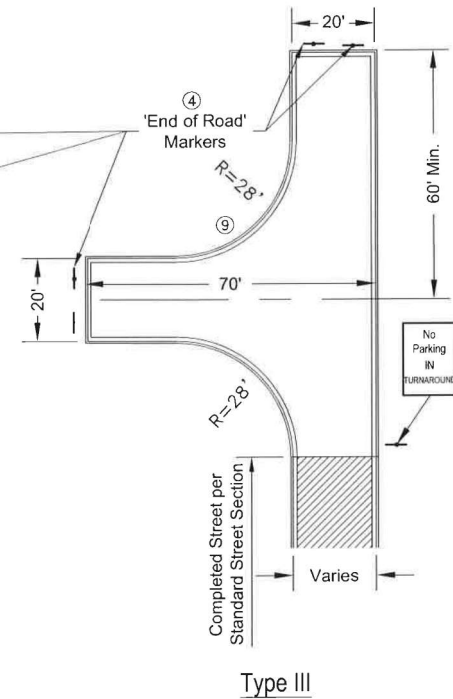
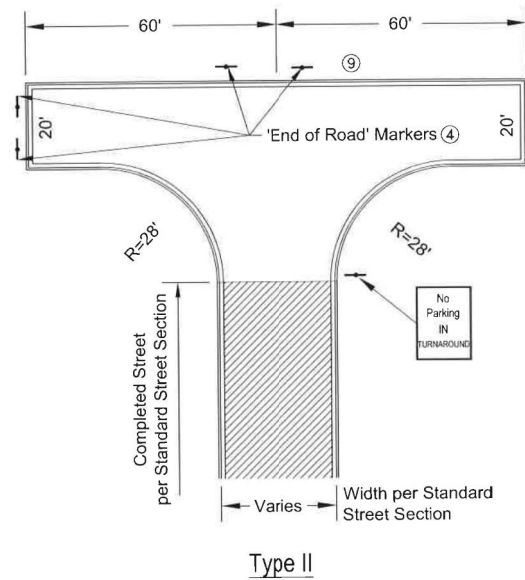
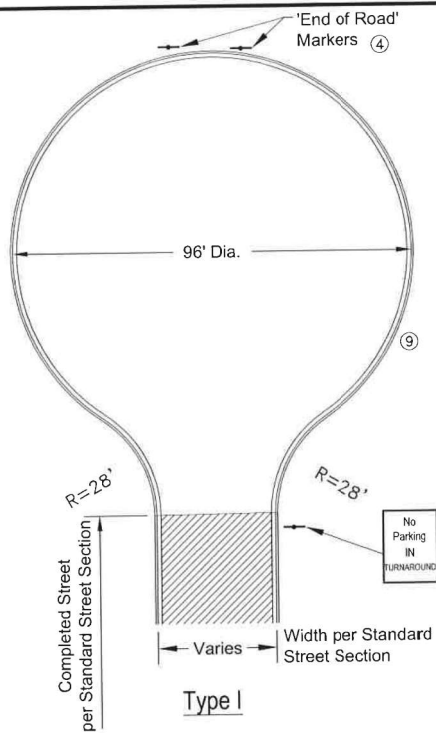
REVISIONS	
DATE	DESCRIPTION

DRAFTED BY: K.Kipp / C.Edwards	CHECKED BY: K.Lilly	DRAWING SCALE: NTS	DATE: 2-26-2014
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CUL-DE-SAC DETAILS

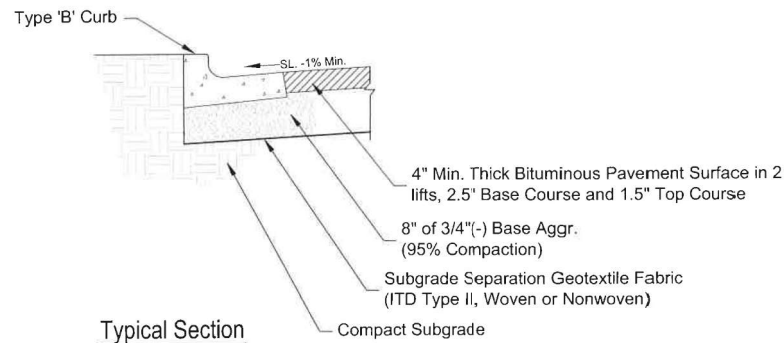
CITY OF MOSCOW
ENGINEERING DEPARTMENT

DRAWING NUMBER:
4



NOTES:

- Other configurations may be approved by the City Engineer and Fire Marshal; basic dimensional criterion shown herein must be satisfied.
- Temporary easements must be granted for those portions of temporary turnarounds outside of platted public utility easements and rights-of-way.
- Temporary turnarounds may be designed to include driveways; public easement required.
- 'End of Roadway' markers per Standard Drawing for End of Road Marker & Dead End Signs must be placed as shown.
- All signs to be furnished and installed by 'Developer.' Signs and installation to be in accordance with MUTCD and City Specifications.
- One street light required. Locate as per Standard Drawing for Residential Street Lighting.
- Temporary turnarounds with steep embankments exceeding three feet (3') in height must have guardrail or barrier protection; as required and/or approved by the City Engineer.
- Temporary turnarounds shall be designed to provide a minimum drainage slope of 1% to an approved public storm drainage system; including catch basins and piping, as required.
- Curb, Type 'B' required all-around or as approved by the City Engineer.



REVISIONS		DESCRIPTION	
DATE			

DRAFTED BY: C. Edwards	CHECKED BY: K. Lilly	DRAWING SCALE: NTS	DATE: 3-5-2014
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TEMPORARY TURNAROUND

CITY OF MOSCOW

ENGINEERING DEPARTMENT

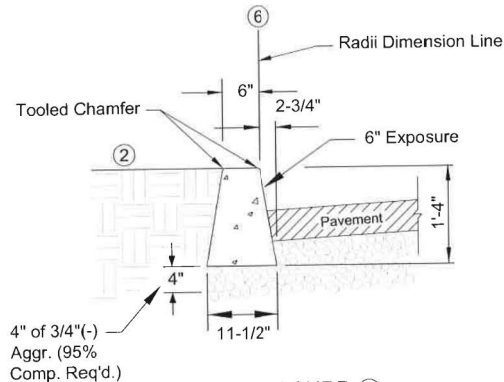
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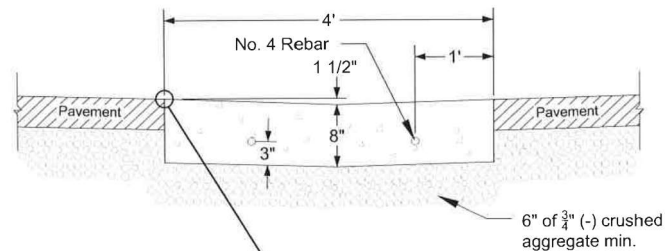
NOTES:

1. Replacement curb and sidewalk may be cast monolithic with prior approval of City Engineer.
2. Sidewalk to back-of-curb slope may not exceed 12:1 without City Engineer's approval.
3. Light broom finish curb parallel with the long axis of curb.
4. Rolled curb prohibited where sidewalk is adjacent to curb, unless specially allowed by the City Engineer. In areas without planter strips, sidewalks adjacent to rolled curb shall be a minimum of six inches (6") thick.
5. All curb roadway planimetric radii dimensions shall be measured to the "Radii Dimension Line" shown in the typical curb section.
6. See table for curb radii requirements. Thirty foot (30') curb radii are required where any City street intersects an Idaho Transportation Department roadway.

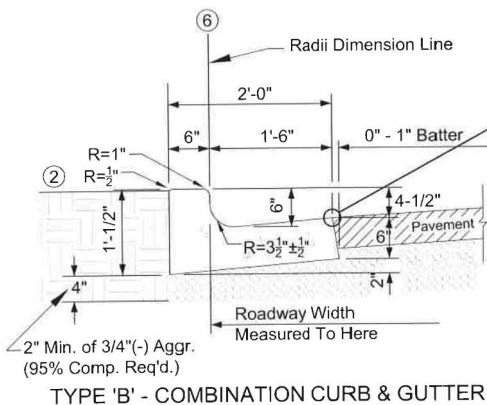
7. 'Shed' section streets require 'spill curb' on the uphill side with gutter matching street cross slope.
8. Type 'A' curb only allowed where extending or replacing existing Type 'A' Curb.
9. Type 'C' curb only allowed in cul-de-sacs and where replacing existing rolled curb.



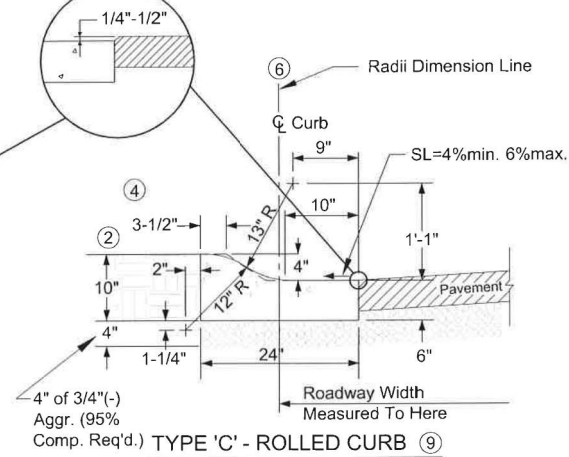
TYPE 'A' CURB ⑧



TYPE 'D' - VALLEY GUTTER



TYPE 'B' - COMBINATION CURB & GUTTER



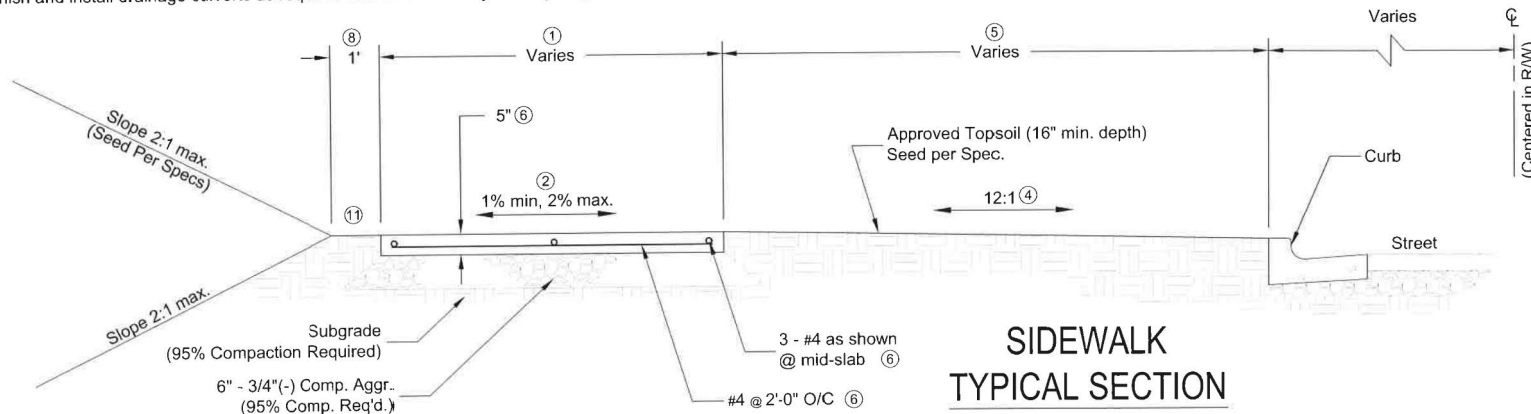
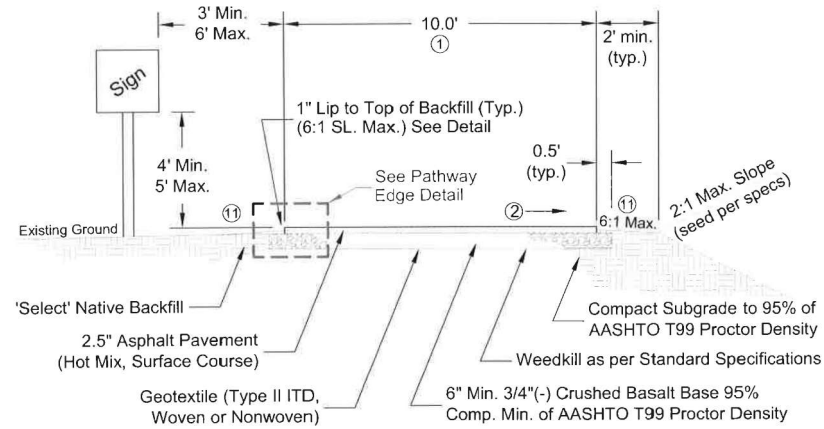
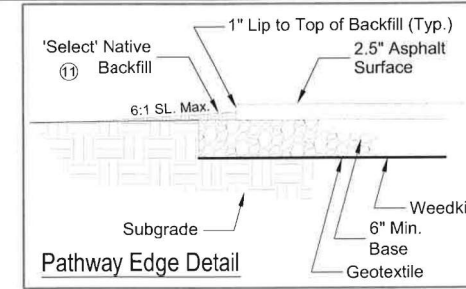
TYPE 'C' - ROLLED CURB ⑨

CURB RADII REQUIREMENTS	
Intersecting Street Classification	Curb Radii Dimension
Local - Local	15'
Local - Collector	15'
Local - Arterial	25'
Collector - Collector	25'
Collector - Arterial	25'
Arterial - Arterial	30'

REVISIONS	DATE	DESCRIPTION
SIGNED AND DATED	DATE	DESCRIPTION
DRAFTED BY:	C. Edwards / K. Kipp	
CHECKED BY:	K. Lilly	
DRAWING SCALE:	NTS	
DATE:	3-5-2014	
CURBS & GUTTERS		CITY OF MOSCOW ENGINEERING DEPARTMENT
DRAWING NUMBER:		6

NOTES:

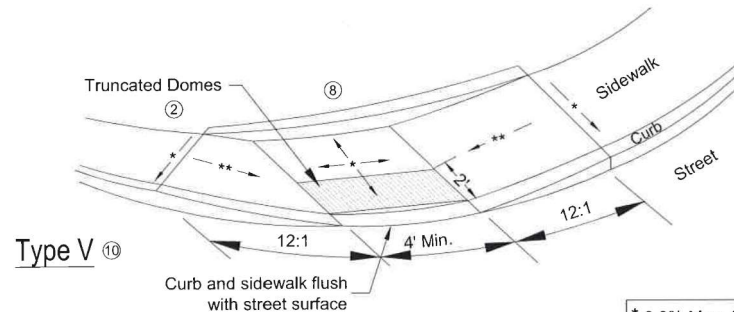
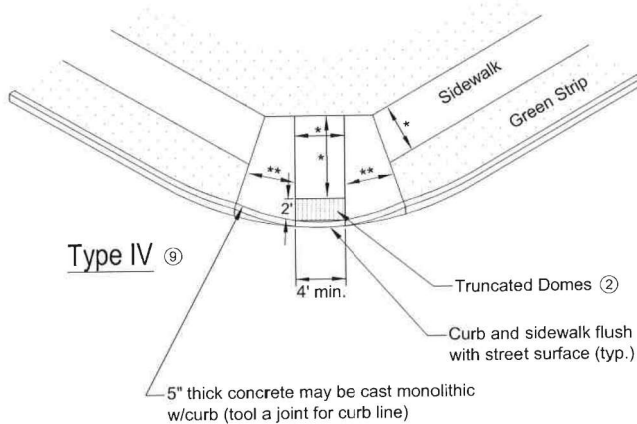
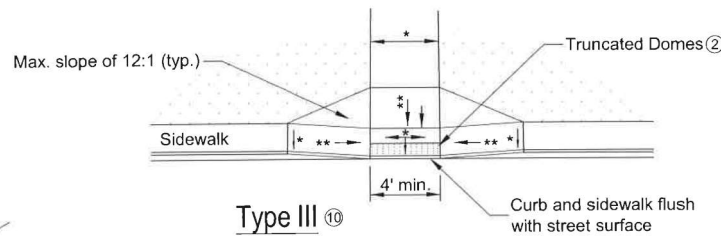
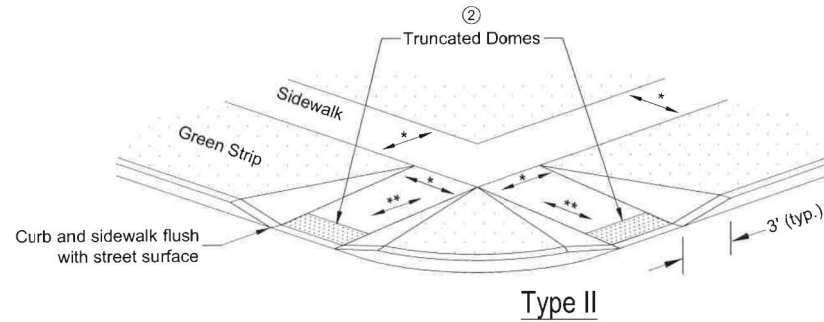
- Minimum sidewalk widths shall be five feet (5') for local streets. For sidewalk widths for collectors and arterials, see Standard Street Section Drawings. Pathway width shall be ten feet (10') unless otherwise approved by the City Engineer.
- Maximum cross slope of 2.0%; minimum cross slope of 1% - pathway cross slope may be 'crown' or 'shed'. Maximum sustained longitudinal grade for pathways of 5%. Pathways shall be free of humps, dips, or unnecessary curves.
- Curb and sidewalk may be cast monolithic for repairs only with prior approval of City Engineer.
- Slope from sidewalk to back-of-curb may not exceed 12:1 without City Engineer's approval.
- Green strip required between curb and sidewalk width as specified in Standard Street Section Drawings. In areas of excessive cuts and fills, width may be reduced, as approved by the City Engineer.
- Sidewalks shall be five inches (5") thick as shown on this drawing - with the following exceptions:
 - Sidewalks through driveways shall be six inches (6") thick and constructed per the Std. Dwg. for Driveway Approaches.
 - Sidewalks constructed adjacent to rolled curb shall be six inches (6") thick and reinforced as shown on this drawing.
 - Reinforcement as directed by City Engineer.
- Coarse broom finish sidewalk concrete perpendicular to the long axis of sidewalk; light broom finish curb concrete parallel to the long axis of curb.
- This dimension shall be four feet (4') where standard franchise utility pedestals (excluding transformers) are to be located and shall be six feet (6') where pedestals and an AVISTA power transformer pad is required (see Standard Drawing for Franchise Utility Details).
- Any trees adjacent to or with branches overhanging the pathway shall be kept trimmed such that ten feet (10') of both vertical and horizontal clearance exists between any branches and the pathway. Landscape vegetation cannot overhang sidewalk.
- If fall protection is required by code, railing should be installed with a minimum height of 42" and a minimum height of 54" for bridges. Railing style must be approved by City Engineer.
- 'Select' native backfill shall be free of clods, roots, gravel, and other inert material and shall be neatly graded to blend with the path and the adjoining ground. Backfill shall be compacted to 90% within 2' of path edge.
- Furnish and install drainage culverts as required and as directed by the City Engineer.



REVISIONS		DESCRIPTION	
DATE			
SIGNED AND DATED 			
DRAFTED BY:	C. Edwards	CHECKED BY:	K. Lilly
DRAWING SCALE:	NTS	DATE:	3-5-2014
SIDEWALKS & PATHWAYS		CITY OF MOSCOW ENGINEERING DEPARTMENT	
DRAWING NUMBER:		7	

1. Moscow Standard Construction Specifications apply. Pedestrian ramps must comply with current Americans with Disability Act (ADA) Accessibility Guidelines.
2. All ramps shall be textured with Detectable Warnings, "Truncated Domes" as required by the current ADA Guidelines and as allowed by the City Engineer. The truncated domes shall extend the full width of the flush curb ramp and two feet (2') radial to back of curb. Truncated Domes shall be prefabricated plate units cast monolithic with the concrete and set flush and to manufactured specifications. Coarse broom finish the remainder of the ramp.
3. All curb roadway planimetric radii dimensions shall be measured to the 'Radii Dimension Line' shown in the typical curb sections. See Standard Drawing for Curbs & Sidewalks. Curb radii shall conform to "Curb Radii Requirements" table in Standard Drawing for Curbs & Gutters.
4. Light broom finish curbs and gutters parallel with the long axis of the curb and/or curb and gutter. Coarse broom finish sidewalks perpendicular to the long axis of sidewalk.

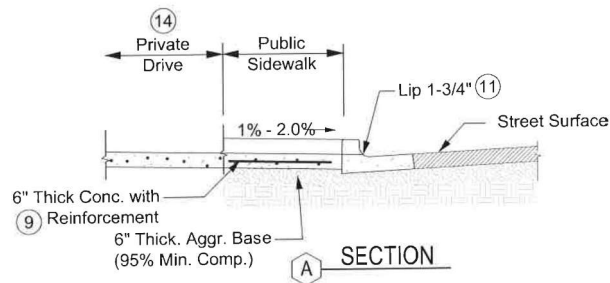
-



* 2.0% Max. Slope (8)
** 12:1 Max. Slope

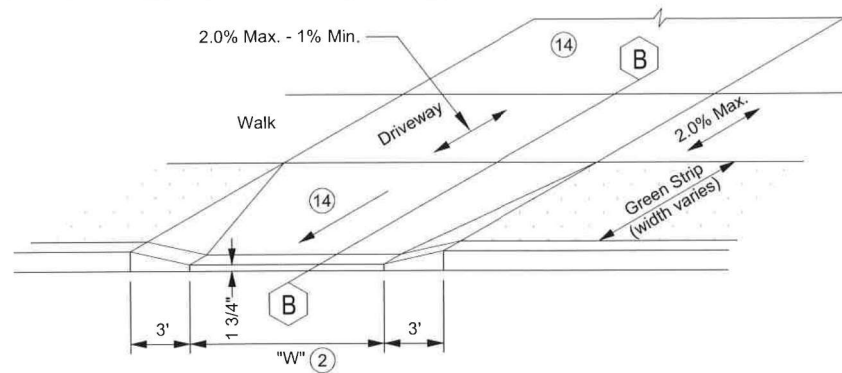
PEDESTRIAN RAMPS	DRAFTED BY: K.Kipp / B.Buvel C.Edwards	SIGNED AND DATED	REVISIONS
	CHECKED BY: K.Lilly		DATE
	DRAWING SCALE: NTS		DESCRIPTION
	DATE: 3-5-2014		
DRAWING NUMBER: 08			

TYPE I

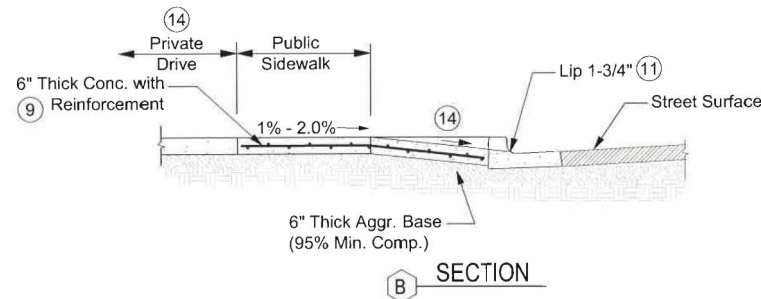


NOTES:

1. Existing curb and sidewalk section to be removed (sawcuts required) prior to construction of vehicular approaches.
2. The width "W" of a vehicle approach providing access to residential uses shall be a maximum of twenty feet (20'). Vehicle approaches providing two-way access to commercial uses shall be a maximum of thirty feet (30') wide unless a wider width is deemed appropriate by the City Engineer.
3. Vehicle approaches shall be located at least thirty feet (30') from the intersection of the curb line of an intersecting street.
4. Approaches shall be limited to one per street frontage for each lot, with the following exceptions:
 - a. Two twenty foot (20') curb cuts may be permitted to commercial uses where one cut will be egress only and the other ingress only.
 - b. Additional approaches may be authorized by the City Engineer where, in his/her opinion, an exceptionally long street frontage or traffic conditions in the area justify such approaches.
5. Truncated domes are not to be installed in sidewalk at driveways.
6. A City of Moscow excavation permit is required to construct new driveways through existing curbs and sidewalks.

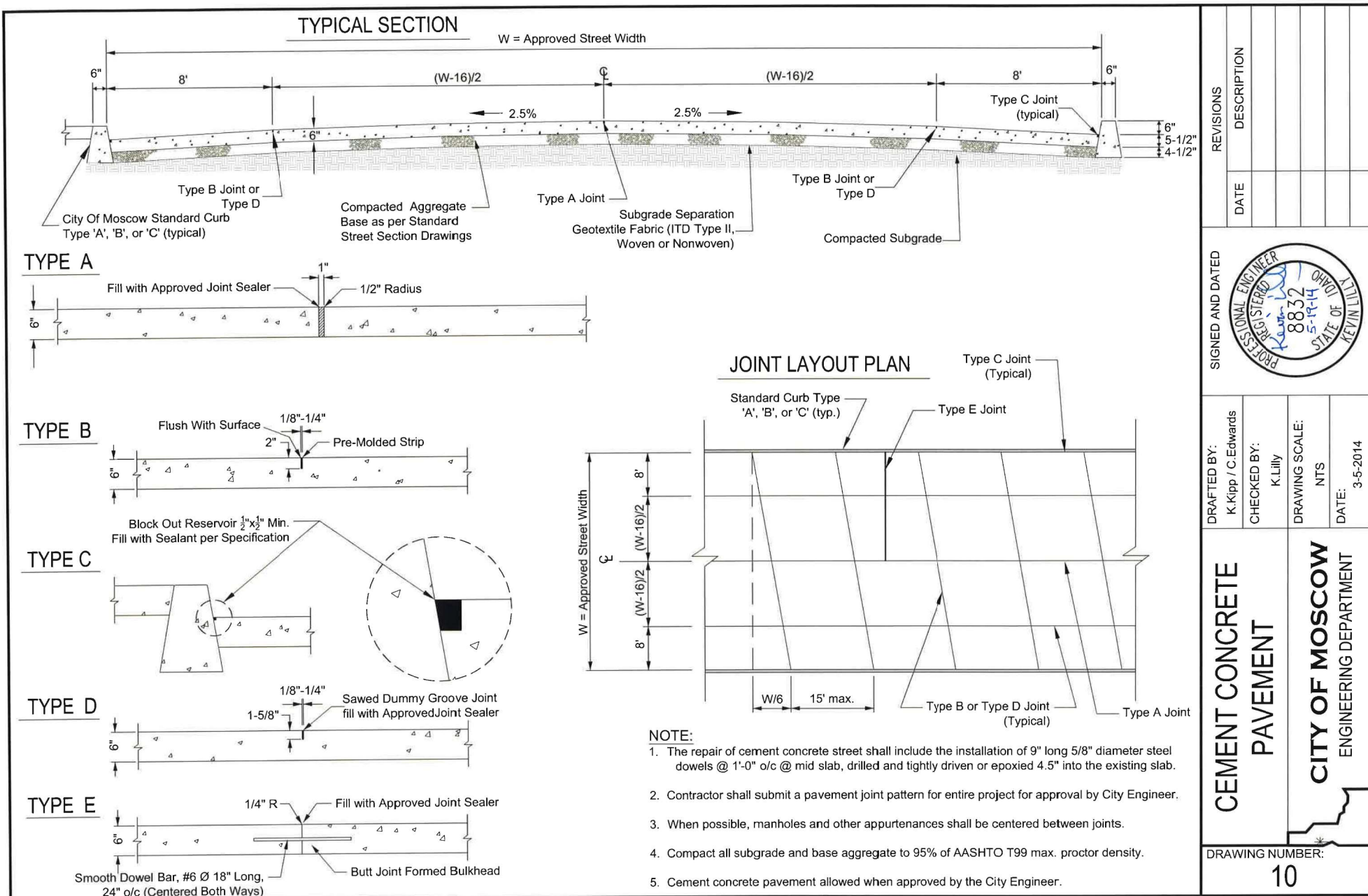


TYPE II



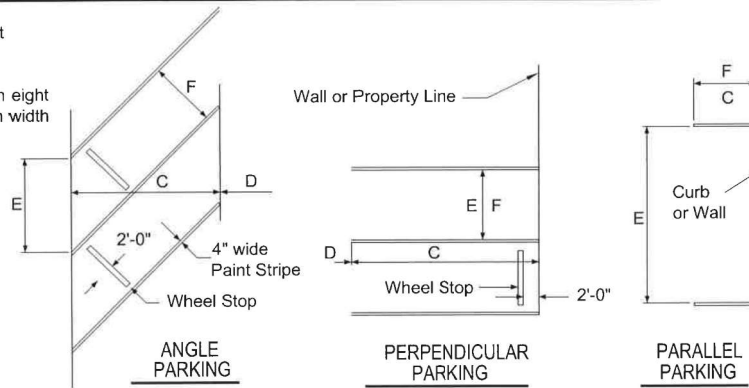
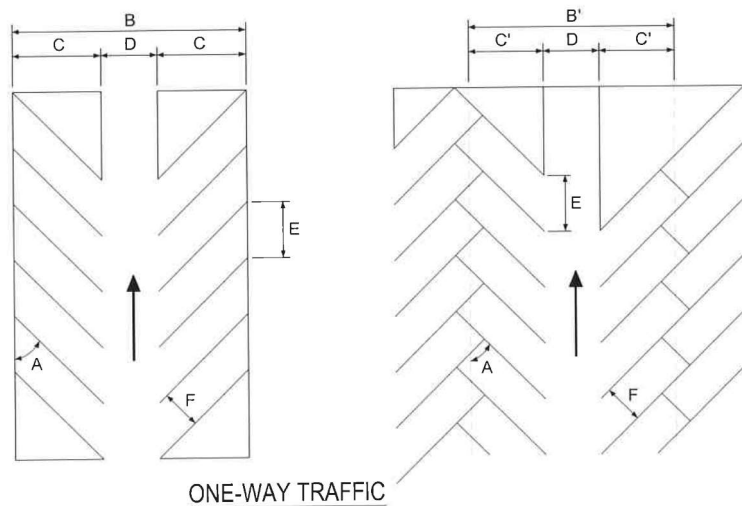
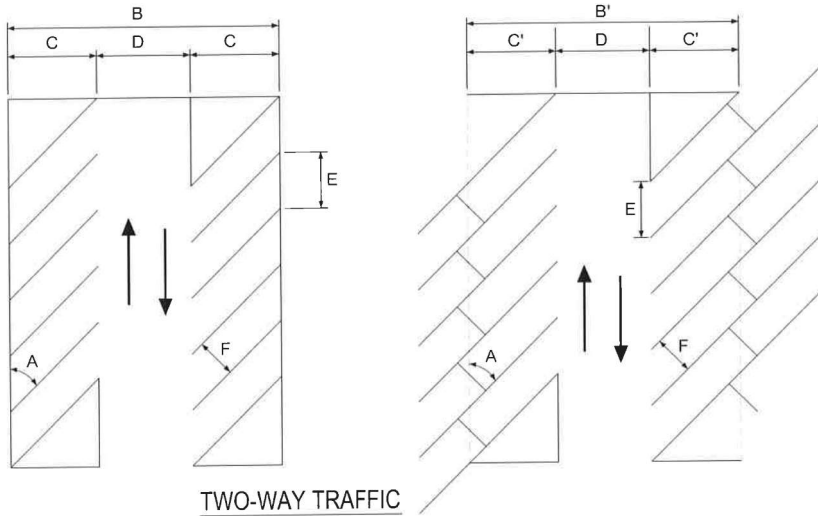
7. Curb and sidewalk may be cast monolithic with prior approval of City Engineer. (Strike dummy joint at back of curb)
8. Driveways within State of Idaho right-of-way are subject to Idaho Transportation Department standards and permits. Inquire at Moscow Engineering Department (208-883-7034).
9. Reinforcement shall be 6 x 6 - W2.1 / 2.1 welded wire mesh or No. 4 rebar @ 1'-0" centers each way centered in slab.
10. Forms shall be inspected by the City prior to placing concrete. No Exceptions.
11. Lip height shall be 1-3/4" (plus/minus 1/4").
12. Vehicle approaches per this standard required for all driveways.
13. In areas with rolled curb, the number of driveways shall not exceed the number of curb cuts allowed per lot (as per Zoning Code Section 6-4).
14. Allowed gradient per Driveway Grade Limitation Standard Drawing.

DRIVEWAY APPROACHES	DRAFTED BY: K. Kipp / C. Edwards	SIGNED AND DATED 	REVISIONS	
	CHECKED BY: K. Lilly		DATE	DESCRIPTION
	DRAWING SCALE: NOT TO SCALE			
	DATE: 3-5-2014			
	CITY OF MOSCOW ENGINEERING DEPARTMENT			
DRAWING NUMBER: 9				



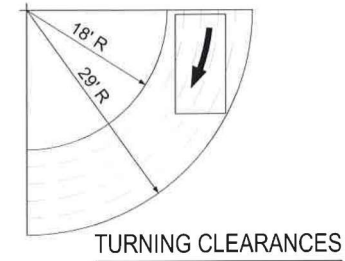
NOTE:

1. CITY CODE HAS PRECEDENCE OVER THIS DRAWING. Parking lots shall conform strictly to the Off-Street Parking Requirements of City Code (Title 4, Section 6-5).
2. See also ADA Standards and International Building Code for Design Accessibility.
3. Single ADA accessible vehicle spaces require a five foot (5') access aisle. Van accessible stalls shall have an eight foot (8') wide aisle width. Two (2) ADA accessible spaces may share a common access aisle with a minimum width of eight feet (8'). Spaces to be standard vehicle size.
4. Dimensions shown are minimum; user friendly lots exceed these dimensions.
5. Fire Code requirements relative to traffic aisle width have precedence over this drawing.
6. Sidewalk adjacent to curb shall slope -2.0% or -1% toward curb.



Minimum Number of Accessible Parking Spaces
ADA Standards for Accessible Design 4.1.2(5)

Total Parking Spaces In Lot	Total Minimum Accessible Spaces	Spaces Requiring Van Accessible 8' Access Aisle
1 to 25	1	1
26 to 50	2	1
51 to 75	3	1
76 to 100	4	1
101 to 150	5	1
151 to 200	6	1
201 to 300	7	1
301 to 400	8	1
401 to 500	9	2
501 to 1000	2% of Total	1/8 of Total Minimum Accessible Spaces
1001 and over	20 plus 1 for each 100 over 1000	



A	B	C	D	E	F	B'	C'
PARKING ANGLE	PARKING SECTION WIDTH	PARKING BANK WIDTH	TRAFFIC AISLE WIDTH	CURB LENGTH PER CAR	CAR STALL WIDTH	PARKING SECTION WIDTH	PARKING BANK WIDTH
TWO WAY TRAFFIC STANDARD VEHICLES							
0°	36'	8'	20'	23'	8'		
45°	58'	19'	20'	12'	8.5'	51'	15.5'
60°	60'	20'	20'	9.8'	8.5'	55'	17.5'
90°	64'	20'	24'	9'	9'		
TWO WAY TRAFFIC COMPACT VEHICLES							
0°	35'	7.5'	20'	15'	7.5'		
45°	52'	16'	20'	10.6'	7.5'	47'	13.3'
60°	54'	16.8'	20'	8.7'	7.5'	50'	14.9'
90°	50'	15'	20'	7.5'	7.5'		
ONE WAY TRAFFIC STANDARD VEHICLES							
0°	28'	8'	12'	23'	8'		
45°	50'	19'	12'	12'	8.5'	43'	15.5'
60°	55'	20'	15'	9.8'	8.5'	50'	17.5'
ONE WAY TRAFFIC COMPACT VEHICLES							
0°	27'	7.5'	12'	15'	7.5'		
45°	44'	16'	12'	10.6'	7.5'	39'	13.3'
60°	49'	16.8'	15'	8.7'	7.5'	45'	14.9'

REVISIONS	DESCRIPTION	DATE
SIGNED AND DATED		
DRAFTED BY:	MAS/KWK/CEE	
CHECKED BY:	K. Lilly	
DRAWING SCALE:	NTS	
DATE:	1-27-2012	
PARKING LOT CITY OF MOSCOW ENGINEERING DEPARTMENT		
DRAWING NUMBER: 11		

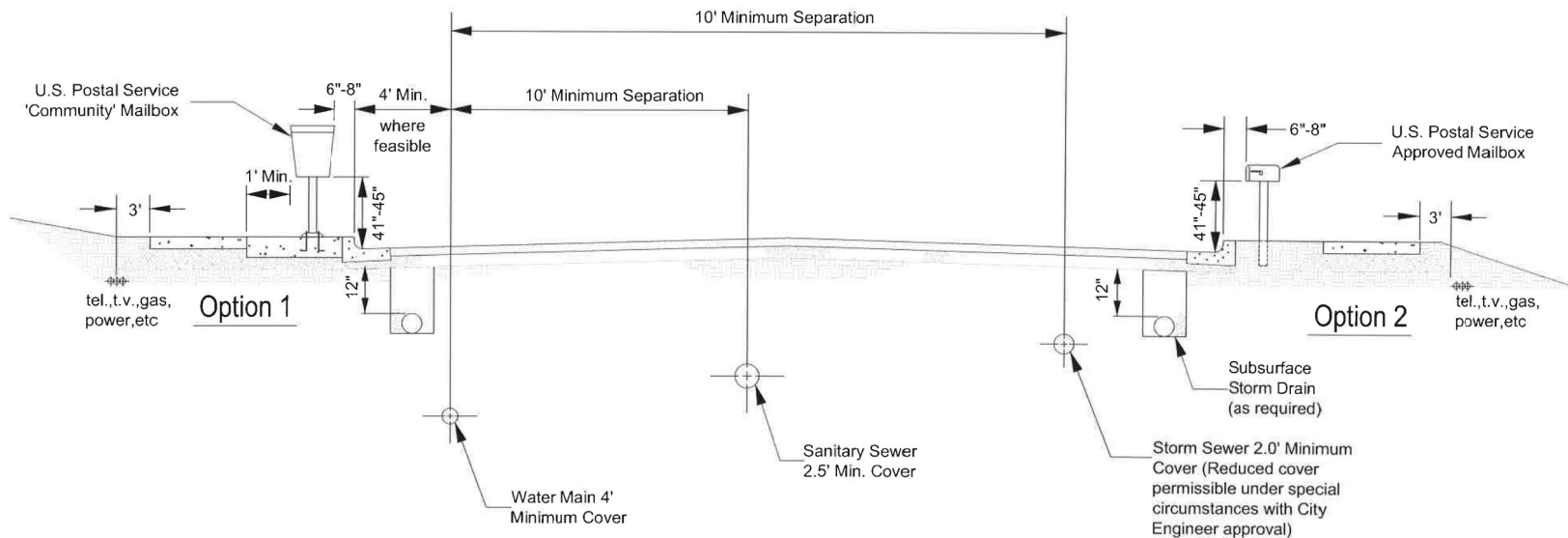


1. TYPE I DRIVEWAY applies to all driveways except those for single family dwellings and duplexes.
2. TYPE II DRIVEWAY applies to single family and duplex lots.
3. Driveway grade must also match existing sidewalk elevation. The City Engineer may allow reconstruction of the sidewalk for the purpose of matching a proposed driveway grade. ADA Standards Apply.
4. Maximum cross slope of driveways shall not exceed 5.0%.
5. Maximum slope of parking areas and aisles shall not exceed 5.0% in any direction.
6. Noted grades measured at driveway centerline.
7. Or as approved by the Building Official.
8. Sidewalk adjacent to curb shall slope -2.0% or -1% towards curb.



NOTES:

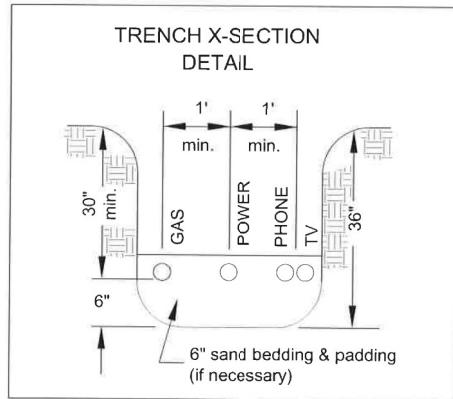
1. The locations of City water, sanitary sewer and storm sewer mains shown are preferred where possible; curvilinear street alignment and tangent utility runs dictate other locations, as approved by the City Engineer.
2. The 'community' style mailboxes shall be placed in locations approved by both the Postal Service and the City Engineer. The Developer is responsible for the construction of 'community' mailbox concrete support slab, all in accordance with U.S. Postal Service construction requirements. The support slab shall extend to the City sidewalk.
3. Utility poles (wood, metal, or other) shall be located with 1.5' minimum clearance from back of curb to face of pole or 1.0' minimum from back of sidewalk to face of pole. Sign posts shall be located 1.5' minimum from back of curb; their location shall also conform to MUTCD requirements.
4. Franchise utilities, including pedestals shall be located within street right-of-way or public utility easement and as shown on the Standard Drawing for Franchise Utility Details.



TYPICAL SECTION

		UTILITY & MAIL BOX LOCATIONS CITY OF MOSCOW ENGINEERING DEPARTMENT		DRAFTED BY: K.Kipp / M.Sass CHECKED BY: K.Lilly DRAWING SCALE: NTS DATE: 3-31-2014	SIGNED AND DATED 	REVISIONS	
						DATE	DESCRIPTION
DRAWING NUMBER: 13							

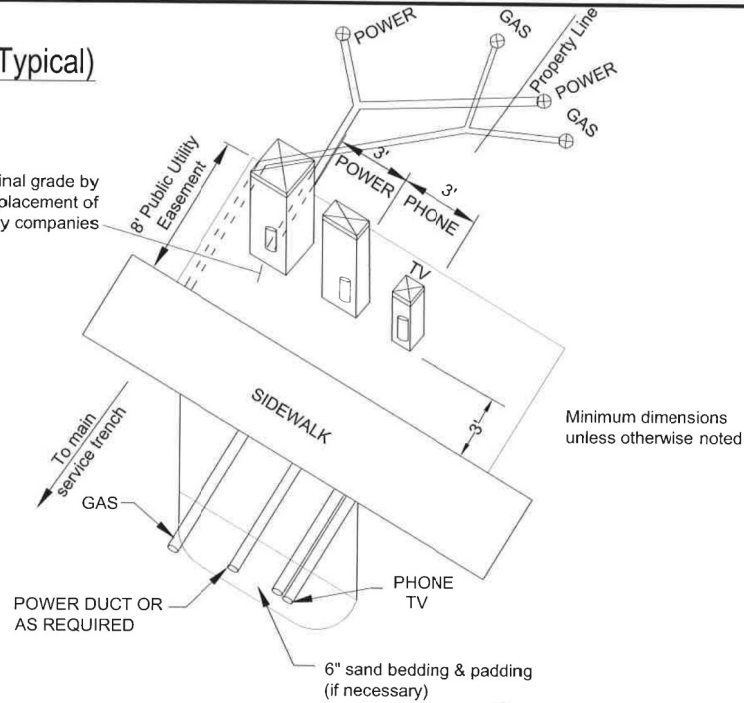
ROAD CROSSING FOR SECONDARY PEDESTAL (Typical)



NOTES:

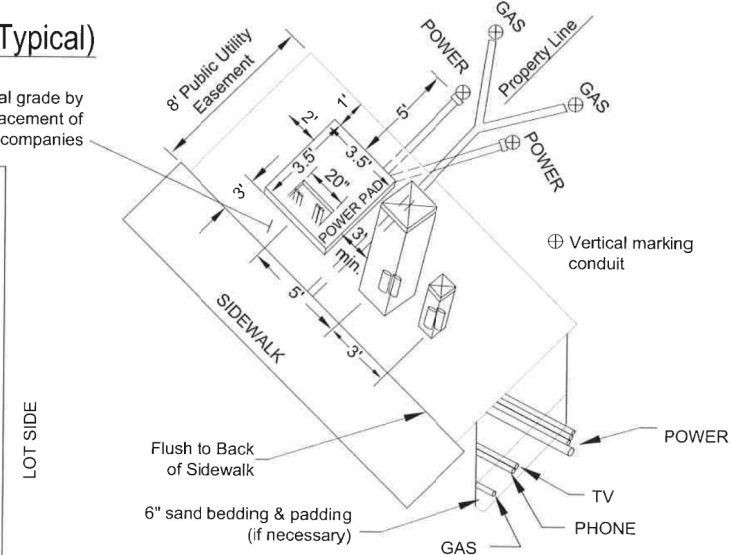
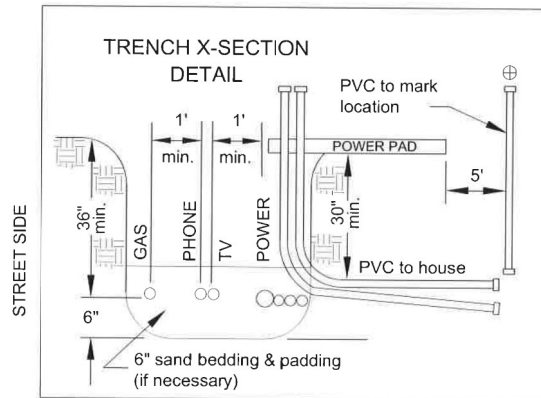
1. Verify conduit sizes with utilities prior to installation.
2. Bundle conduits for each utility at pedestal locations.
3. Dimensions shown are minimum unless otherwise noted.
4. Unless otherwise directed, the Gas, Power, Telephone, and T.V. Cable will be installed on the North and East sides of the street.
5. Furnish and install pull strings in all conduits.

Area to be brought to final grade by "Developer" prior to placement of pedestals by utility companies



MAIN LINE (Typical)

Area to be brought to final grade by "Developer" prior to placement of pedestals by utility companies



REVISIONS	DESCRIPTION
DATE	

DETAIL PROVIDED BY
THE FRANCHISE
UTILITY COMPANIES

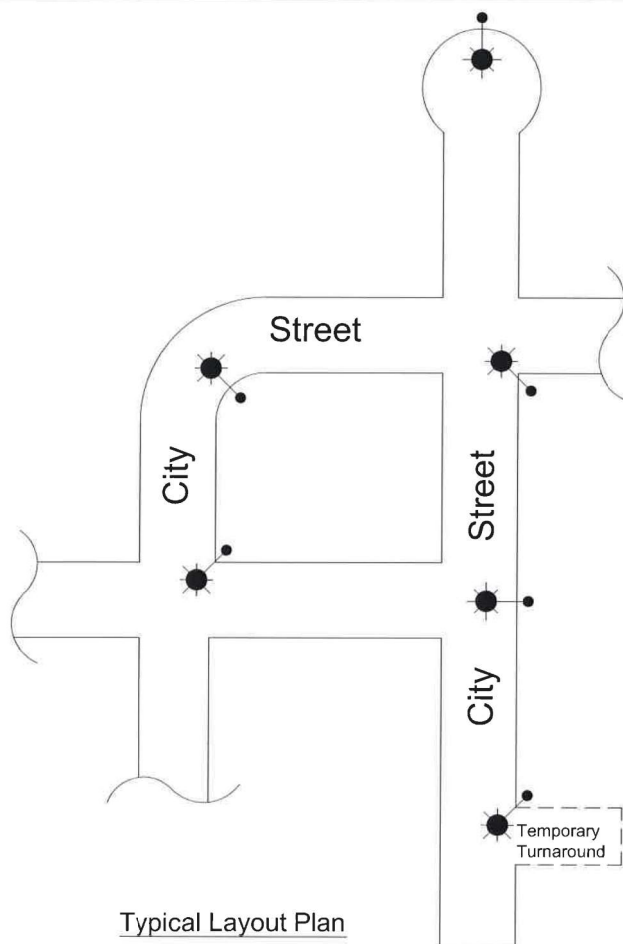
DRAFTED BY: K. Kipp	CHECKED BY: K. Lilly	DRAWING SCALE: NTS	DATE: 1-30-2012
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FRANCHISE UTILITY
DETAILS

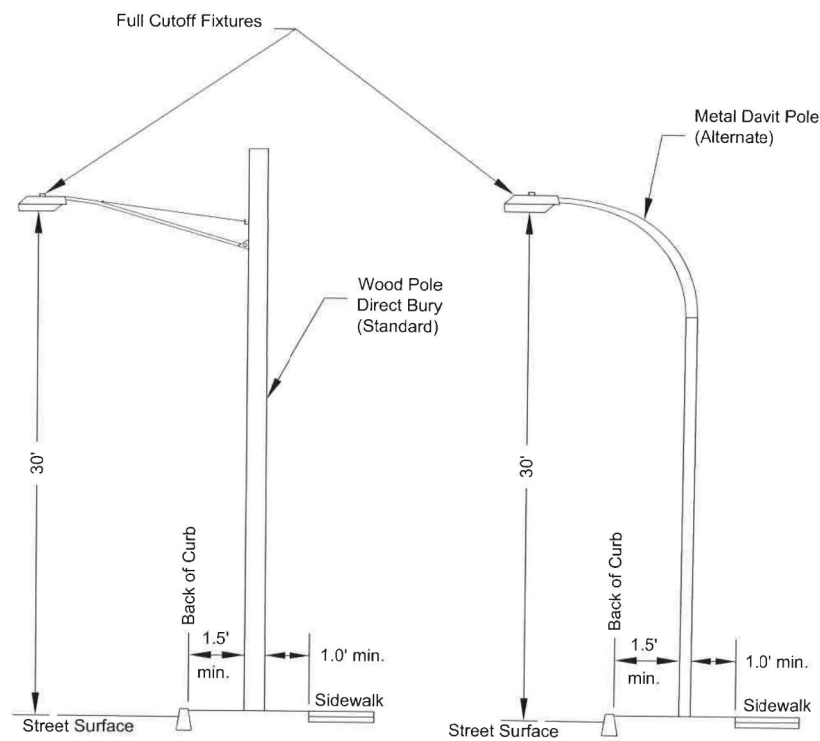
CITY OF MOSCOW
ENGINEERING DEPARTMENT

DRAWING NUMBER:

14



Typical Layout Plan

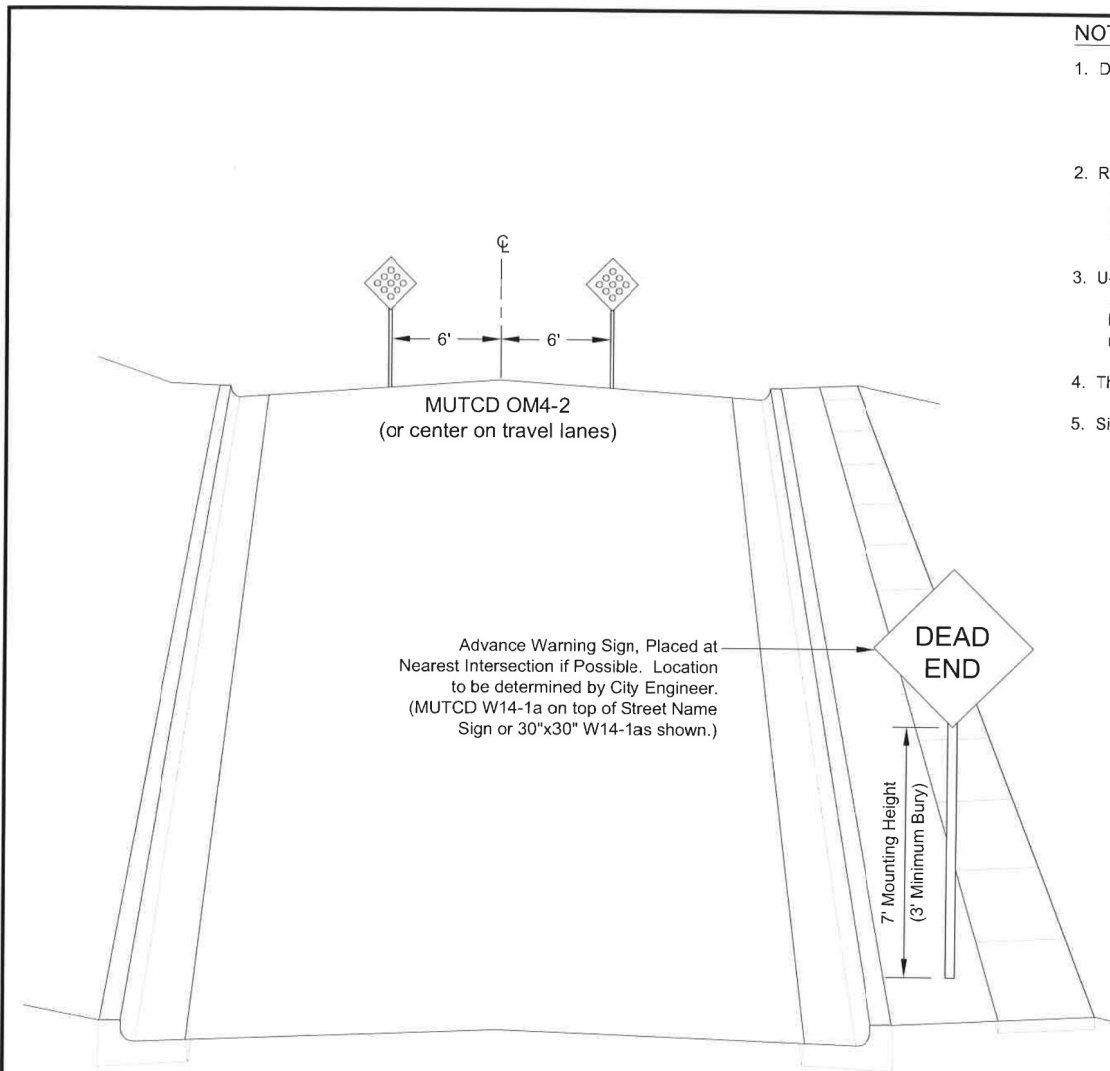


Installation Details

NOTES:

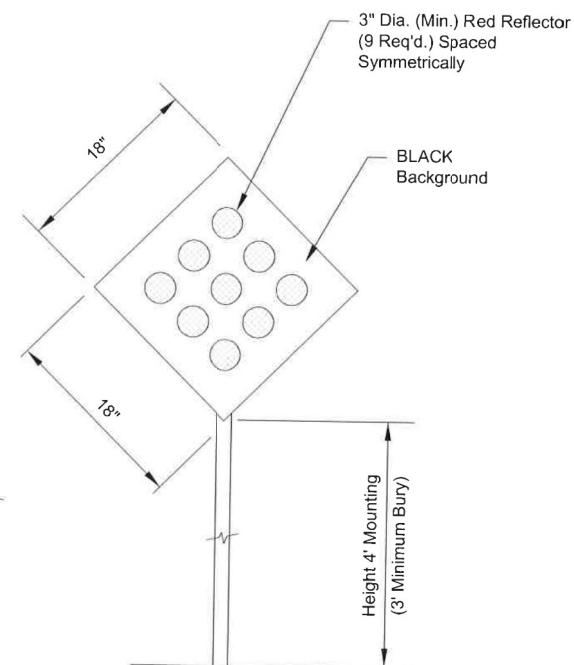
1. Street lights (pole, fixture, and conductors) to be furnished, installed, owned, and maintained by AVISTA. 'Cobra head' style light fixtures are required unless otherwise approve by the City Engineer.
2. Wood street light poles will be furnished and installed as the standard - metal davit poles are allowed but the additional/incremental costs of furnishing metal davit poles shall be paid by the Developer directly to AVISTA.
3. Developer shall furnish and install buried conduit for street lights - all as required by AVISTA - at Developer expense.
4. All street lights shall be full cut-off.
5. Street lights in residential developments will generally be installed at all four-way intersections, three-way (tee) intersections, ninety degree corners, permanent cul-de-sacs, and temporary turnarounds - one at each of these locations. Additional street lights at other locations may be as allowed or required by the City Engineer.
6. Street lights shall comply with Moscow City Code Title 4, Section 6-15.

REVISIONS	DATE	DESCRIPTION
SIGNED AND DATED		
DRAFTED BY:	C. Edwards	
CHECKED BY:	K. Lilly	
DRAWING SCALE:	NTS	
DATE:	3-3-2014	
RESIDENTIAL STREET LIGHTING		
CITY OF MOSCOW ENGINEERING DEPARTMENT		
DRAWING NUMBER:		
15		

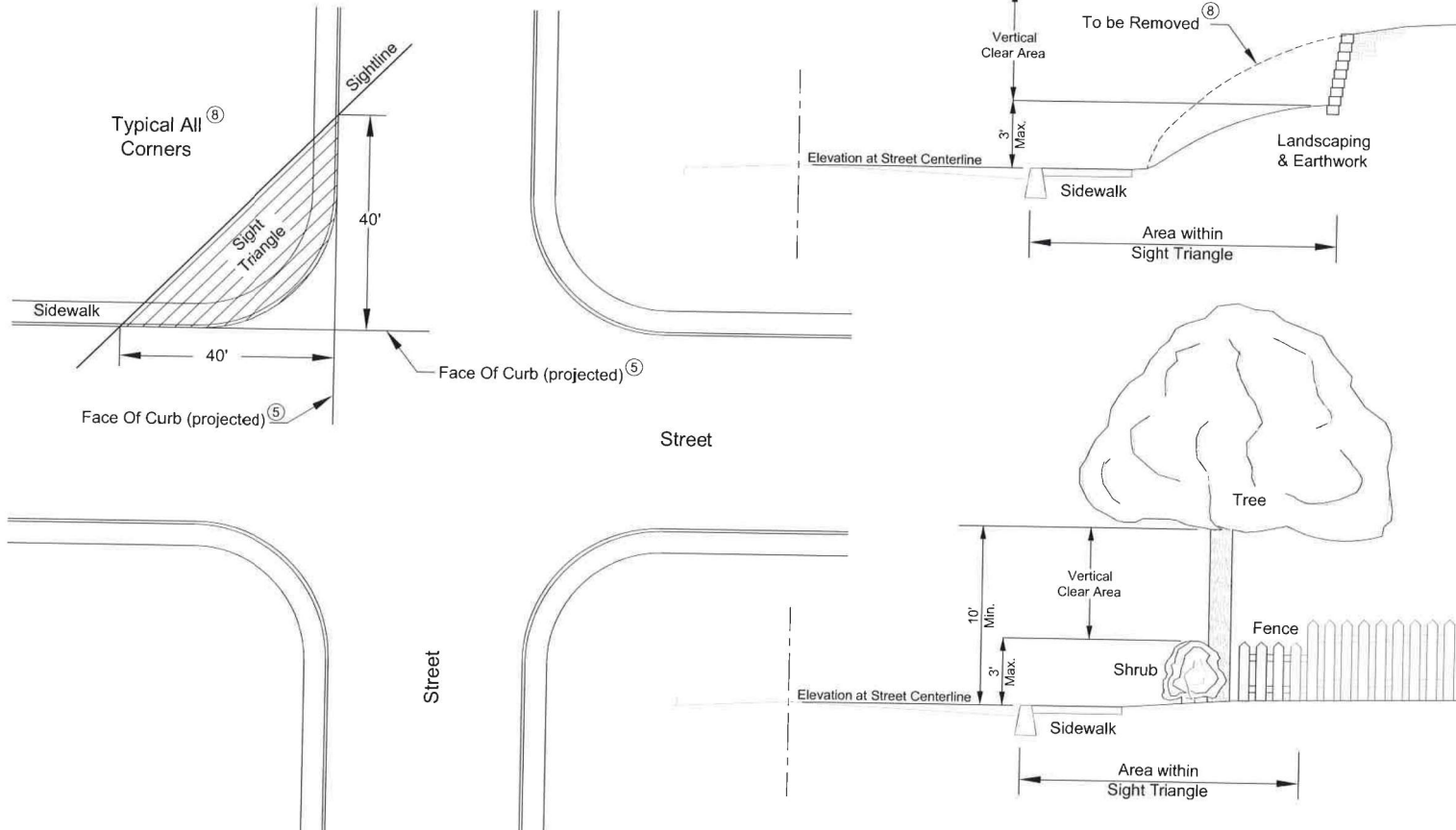


NOTES:

1. DEAD END signs shall be placed as near as possible to the beginning of all streets that terminate (either temporary or permanent) in a dead end or cul-de-sac. END OF ROAD MARKERS (two of them) shall be placed at the end of all terminated streets EXCEPT permanent cul-de-sacs.
2. Reflectors and reflective sheeting shall meet the requirements set forth in the most current editions of the Manual for Uniform Traffic Control Devices and Idaho Transportation Department's Standard Specifications for Highway Construction.
3. U-channel galvanized steel posts weighing 3.0 lbs./ft. and conforming to ASTM A499, or a 4"x4" treated wood post, shall be a minimum requirement. No splicing or bolting of multiple u-channels will be allowed.. All posts shall meet the Engineer's approval.
4. Theft resisting "Tufnut" brand hardware shall be used for sign installation.
5. Signs shall be installed vertically plumb.



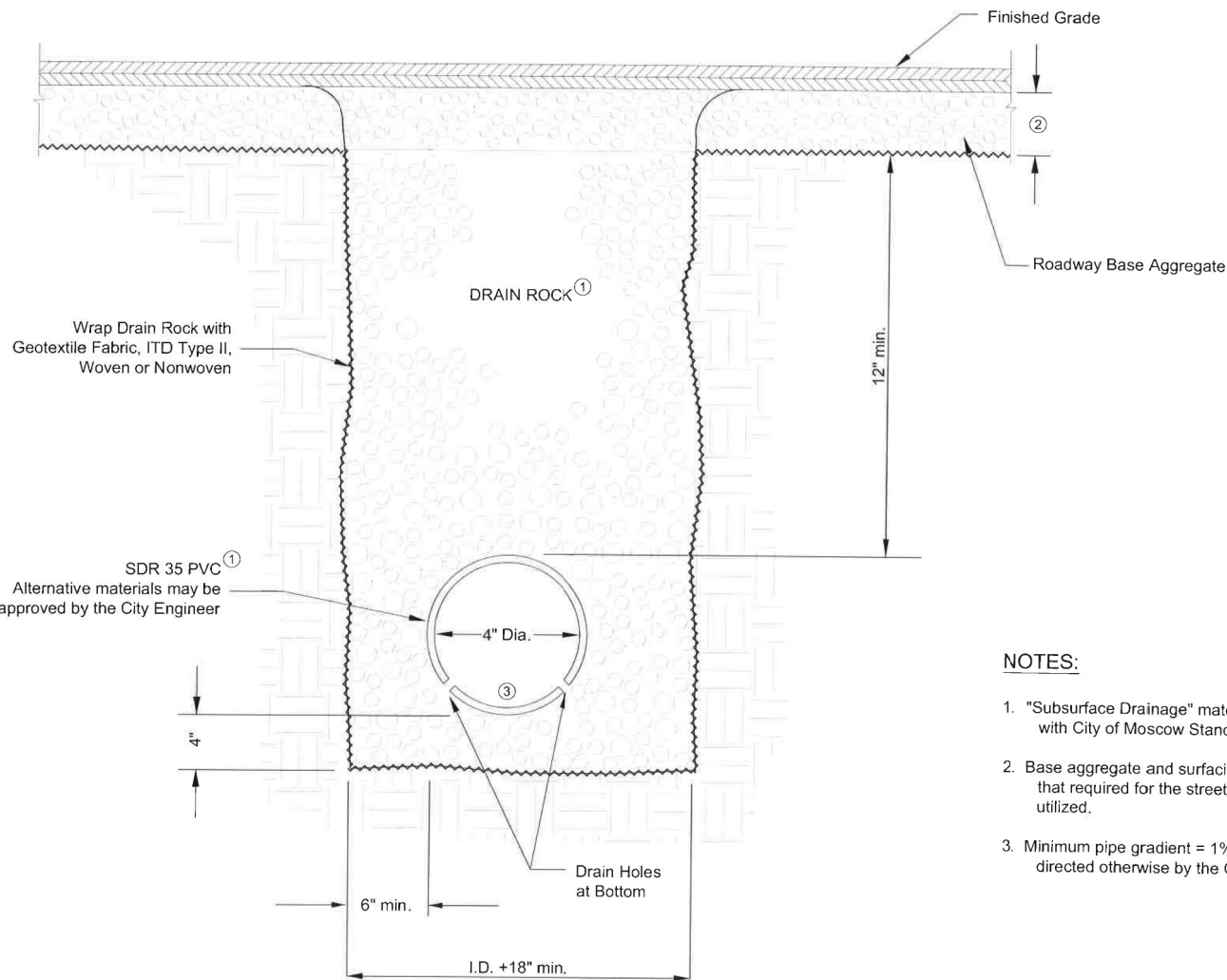
REVISIONS		SIGNED AND DATED	DRAFTED BY:	CHECKED BY:	DRAWING SCALE:	DATE:
DATE	DESCRIPTION					
			RKC/KWK	K. Lilly	NTS	3-3-2014
END OF ROAD MARKERS & DEAD END SIGNS			CITY OF MOSCOW ENGINEERING DEPARTMENT			
DRAWING NUMBER:			16			



Notes:

1. Area within the Sight Triangle shall be kept clear of obstructions to provide the motorist with adequate field of vision at an intersection.
2. Within the Sight Triangle all existing trees shall be kept trimmed such that ten feet (10') of clearance exists between any branches and the ground. Any tree branches overhanging the sidewalk shall be kept trimmed such that ten feet (10') of clearance exists between any branches and the sidewalk.
3. Within the Sight Triangle, all existing shrubs shall be kept trimmed to a maximum height of three feet (3').
4. Sight obstruction Vertical Clear Area measurements shall be in reference to the existing centerline street elevation within the Sight Triangle.
5. If curb does not exist, then the Sight Triangle will be measured by extending the edges of street pavement; on unpaved streets, the Sight Triangle will be measured by extending the edge of the traveled way as determined by the City Engineer.
6. This City Standard enforces Idaho Code 49-221.
7. All dimensional criteria (as shown) must be satisfied.
8. Unusual topography may require more stringent requirements at some locations to obtain adequate Sight Triangles as determined by City Engineer.

REVISIONS		SIGNED AND DATED		DRAFTED BY:		CHECKED BY:		DRAWING SCALE:		DATE:	
DATE	DESCRIPTION			CEE/KWK	K. Lilly	NTS	3-3-2014				
				INTERSECTION SIGHT TRIANGLE CITY OF MOSCOW ENGINEERING DEPARTMENT							
DRAWING NUMBER:				17							



TYPICAL SECTION

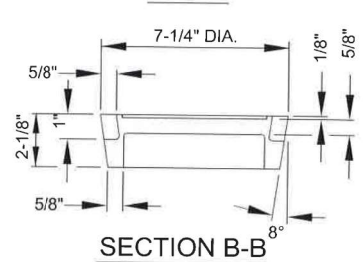
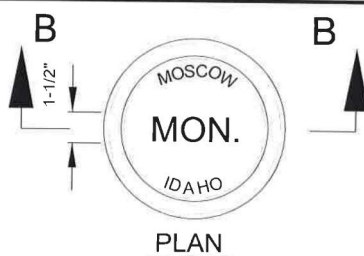
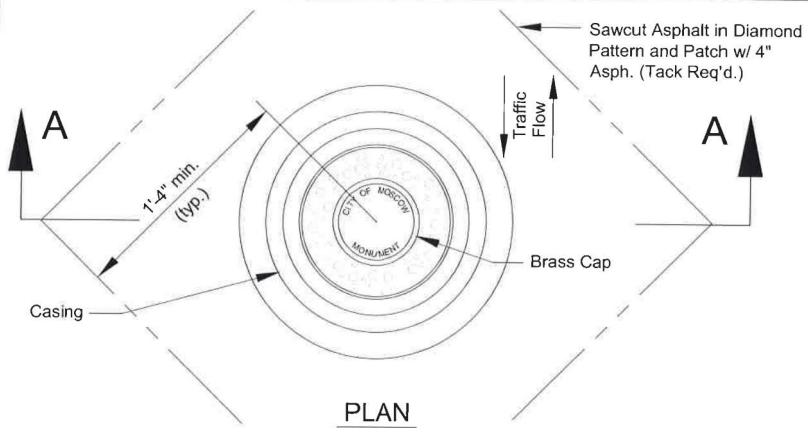
NOTES:

1. "Subsurface Drainage" materials and installation shall comply with City of Moscow Standard Construction Specifications.
2. Base aggregate and surfacing depth and type to be the same as that required for the street section where this trench backfill is utilized.
3. Minimum pipe gradient = 1% unless specifically allowed or directed otherwise by the City Engineer.

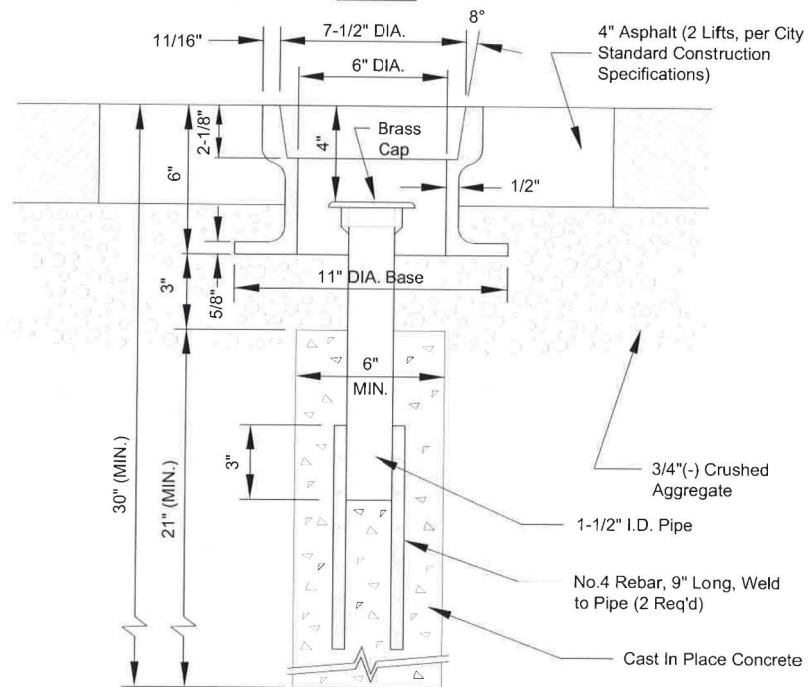
REVISIONS		SIGNED AND DATED	DRAFTED BY:	CHECKED BY:	DRAWING SCALE:	DATE:
DATE	DESCRIPTION					
			KWK/CEE	K. Lilly	NTS	3-3-2014
			SUBSURFACE DRAINAGE CITY OF MOSCOW ENGINEERING DEPARTMENT			
DRAWING NUMBER:		18				



- Page 1289



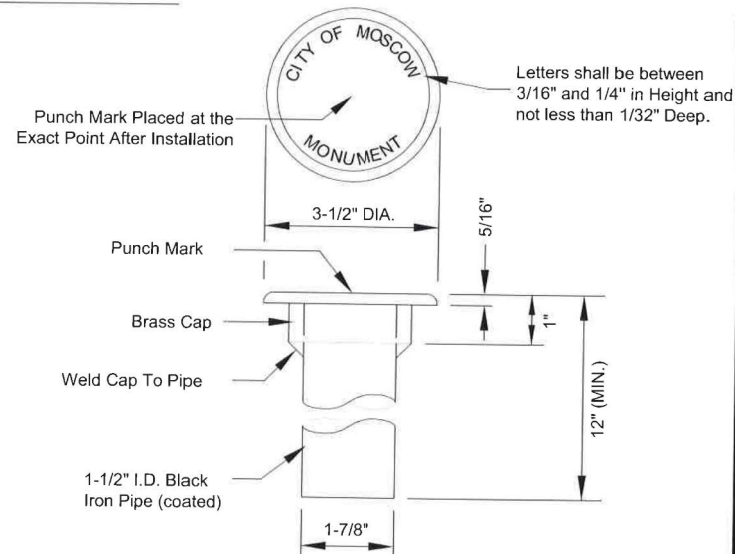
COVER DETAIL



SECTION A-A MONUMENT AND CASING DETAIL

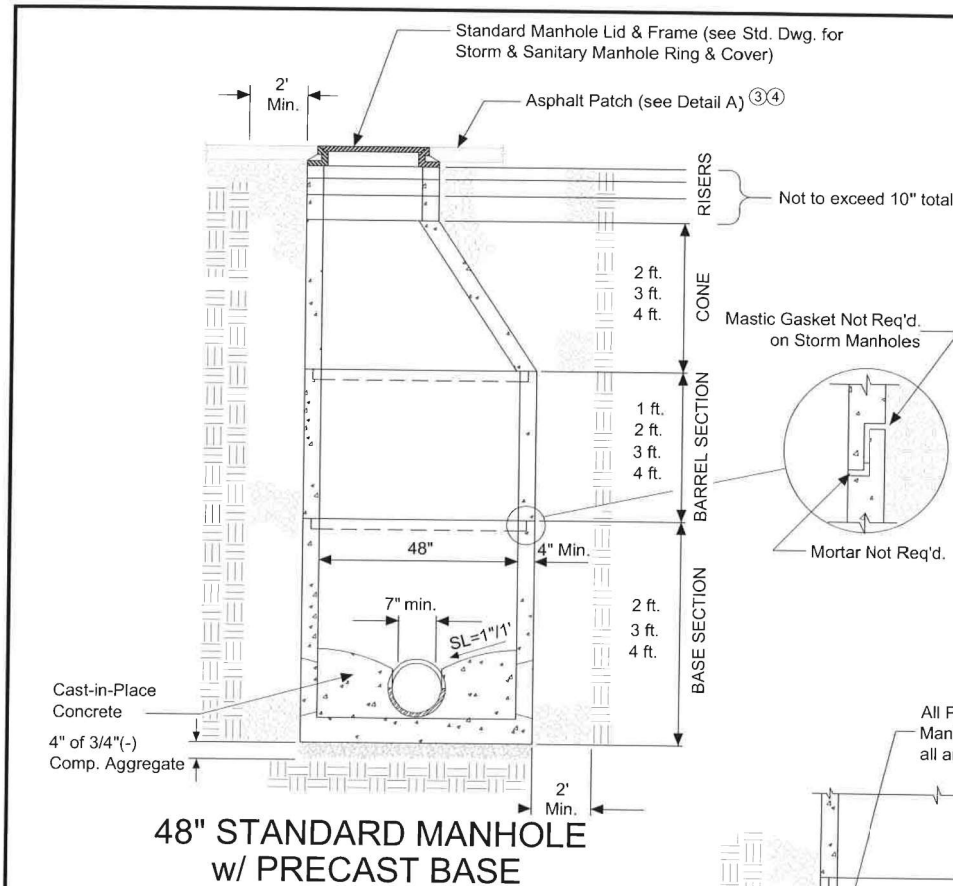
Notes:

1. Cover and casing shall be machined to a true bearing all around.
2. The brass cap shall conform to the requirements of the most current edition of the Idaho Transportation Department's standard specification for highway construction.
3. The casing and cover shall be gray iron castings suitable for heavy traffic loading; minimum unit weight = 46 lbs.
4. All material except the brass cap shall be covered with a protective coating after welding. The coating shall be of a bituminous type or approved equal.
5. The installation shall result in a relatively 'bump-free' street surface, as approved by the city engineer.
6. The cover shall include the wording as shown.
7. All materials shall be manufactured in the U.S.A.

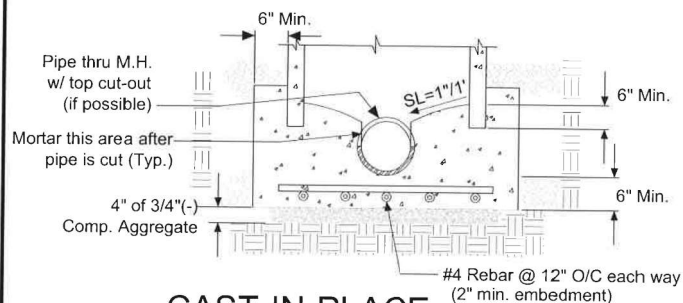


BRASS CAP AND PIPE DETAIL

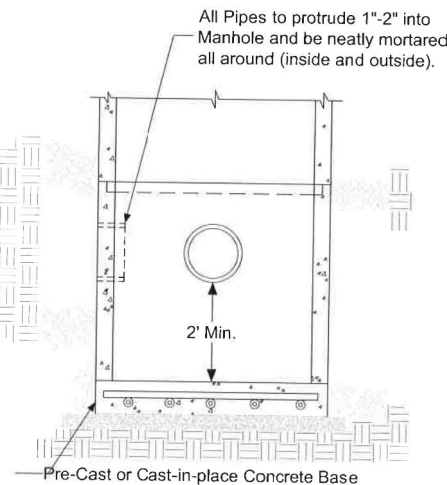
REVISIONS		SIGNED AND DATED		DRAFTED BY:		CHECKED BY:		DRAWING SCALE:		DATE:	
DATE	DESCRIPTION			RKC/KWK		K. Lilly		NTS		1-31-2012	
SURVEY MONUMENT CITY OF MOSCOW ENGINEERING DEPARTMENT											
DRAWING NUMBER: 20											



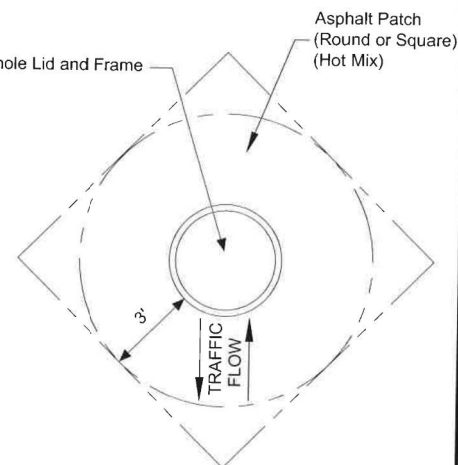
**48" STANDARD MANHOLE
w/ PRECAST BASE**



**CAST-IN-PLACE
ALTERNATE BASE**



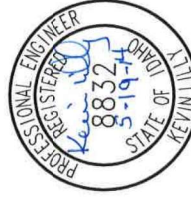
**MANHOLE
w/ CATCH BASE**

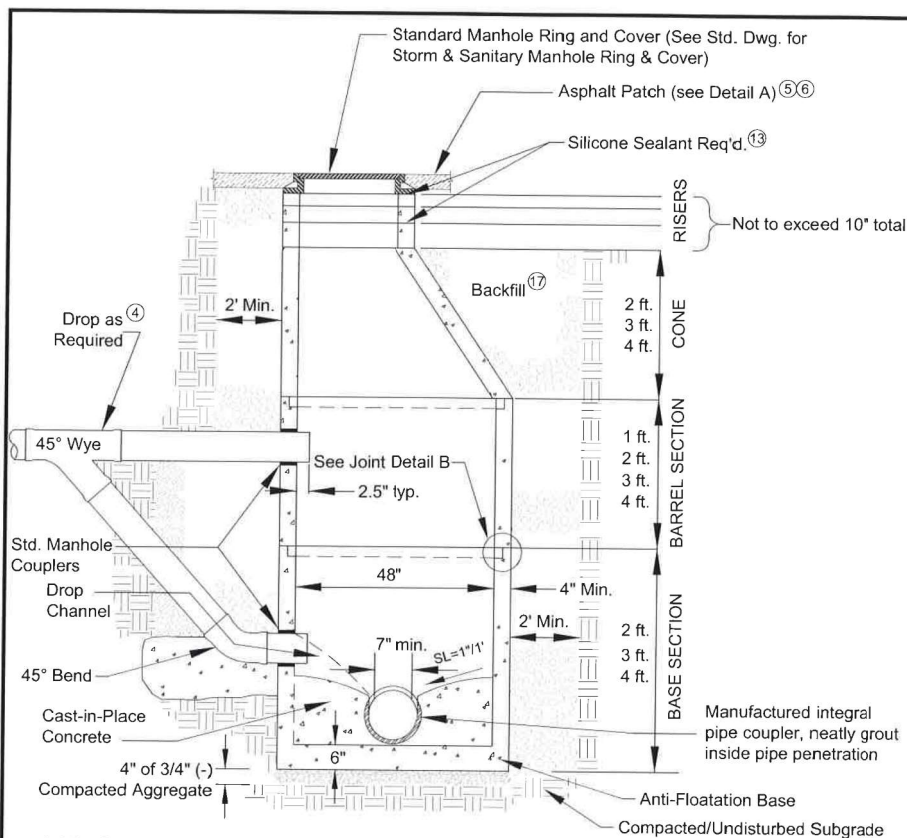


**A ASPHALT PATCH
DETAIL**

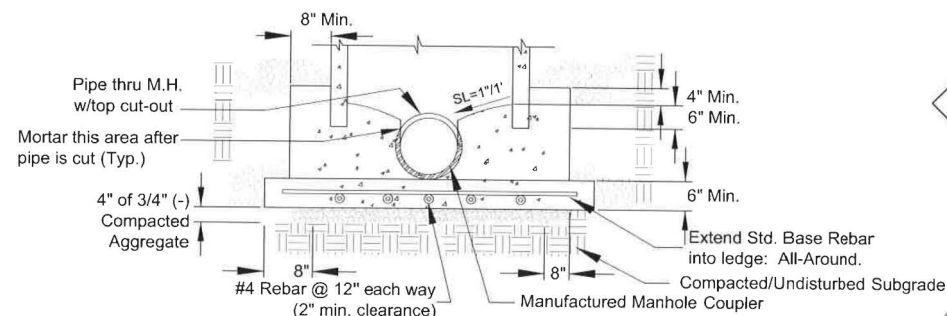
NOTES:

1. Precast bases are preferred.
2. Steps shall not be installed in the manholes.
3. Manholes located in paved areas shall have asphaltic hot mix patch four inches (4") thick with top course mix restoring surface to exact line and grade of street. Manhole lids in new pavement shall be raised and adjusted to finished grade after completion of street paving.
4. Manholes located in unpaved streets or alleys shall have their lids adjusted to two inches (2") below gravel surface.
5. All cast-in-place concrete shall be troweled very smooth.
6. All joints between precast manhole/sections shall be very smooth.
7. All flow across manholes shall be on-tenth of a foot (0.1') fall, unless the flow changes direction more than 45°, then the fall shall be two-tenths of a foot (0.2') or greater.
8. Channels shall be as per Standard Drawing for Manhole Base Details.
9. Lids shall be set a quarter inch ($\frac{1}{4}$ ") below the existing paved street grade.
10. Flat slab top allowed on shallow manholes.
11. Contractors shall comply with the most current OSHA requirements for excavation.
12. WSDOT Catch Basin Type 2 may be required at certain locations by the City Engineer in place of this manhole standard.

REVISIONS	DESCRIPTION	DATE	SIGNED AND DATED	DRAFTED BY:	CHECKED BY:	DRAWING SCALE:	DATE:
				CEE/KWK	K.Lilly	NTS	3-4-2014
							
				STORM SEWER MANHOLE			
				CITY OF MOSCOW ENGINEERING DEPARTMENT			
				DRAWING NUMBER: 21			



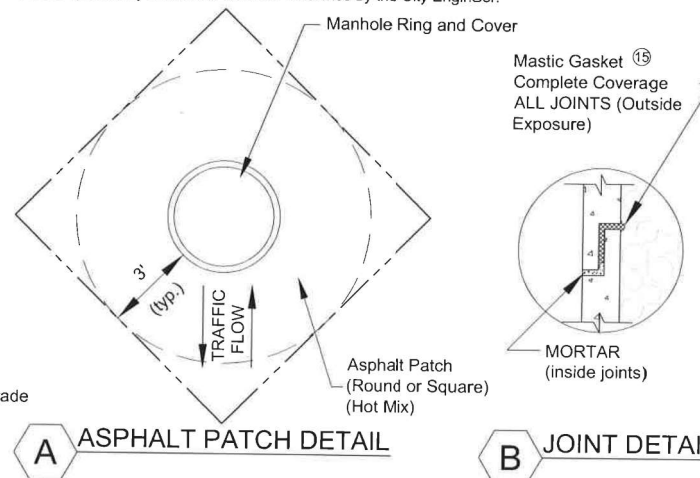
48" STANDARD MANHOLE w/ PRECAST BASE



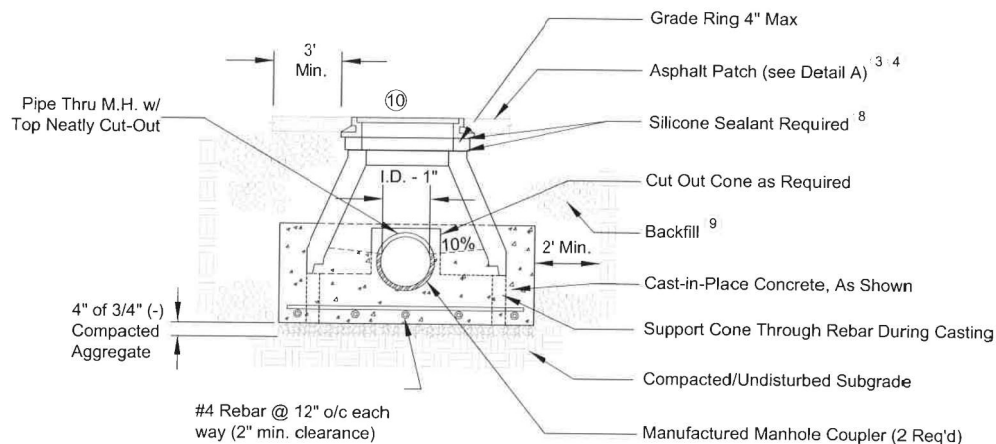
CAST-IN-PLACE ALTERNATE BASE

NOTES:

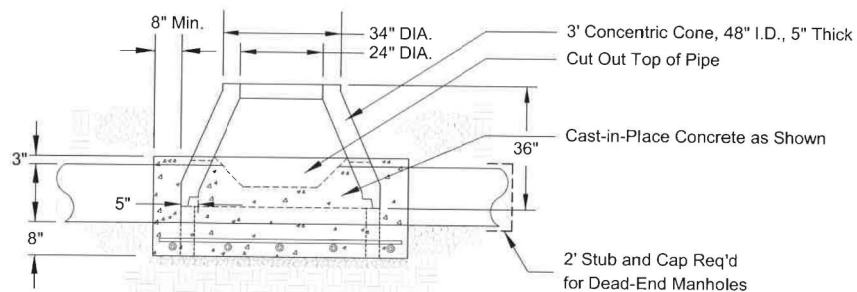
- Precast bases with integral pipe couplers are preferred.
- Manholes shall be constructed watertight and tested per Standard Construction Specifications.
- Steps shall not be installed in the manholes.
- Drop configuration is used when the entrance pipe exceeds two feet (2') above the top of the exit pipe and only with permission of the City Engineer. Drop pipe penetrations shall be neatly mortared. Drop configuration not allowed in new manhole installations.
- Manholes located in paved areas shall have asphaltic patch four inches (4") thick placed in two lifts to existing line and grade of street. Manhole ring shall be 1/4" below finished patch.
- Manholes located in unpaved streets or alleys shall have lid adjusted two inches (2") below gravel surface.
- All cast-in-place conc. shall be troweled smooth.
- All joints between precast manhole/sections shall be sealed with mastic gaskets and finished with mortar.
- All flow across manholes shall be one-tenth of a foot (0.1'), unless the flow changes direction more than 45°, then the fall shall be two-tenths of a foot (0.2') or greater.
- Manufactured watertight manhole couplings required at all pipe penetrations.
- Channels shall be per Manhole Base Details Standard Drawing.
- Shallow manholes may be constructed with flat-top precast lids, as approved by the City Engineer.
- Seal between riser and cone, riser and riser, and riser and frame with two parallel 3/8" diameter beads of silicone sealant.
- Where new manholes are constructed on existing mains, or where existing manholes are modified, all pipe penetrations shall also be sealed on the exterior by the careful and ample application(s) of non-shrink grout. Groutable manufactured collars shall be used on new pipes where they enter existing manholes.
- Manufacturer's standard O-ring joint also acceptable alternate to the standard mastic gasket and mortar joints as shown.
- Contractor shall comply with the most current OSHA requirements for excavations.
- Backfill around manholes shall be Class 'D' for all roadways and alleys; Class 'A' for all other locations unless specifically allowed or directed otherwise by the City Engineer.



REVISIONS	DESCRIPTION	DATE	SIGNED AND DATED	DRAFTED BY:	CHECKED BY:	DRAWING SCALE:	DATE:
				CEE/KWK	K.Lilly	NTS	3-4-2014
PROFESSIONAL ENGINEER 8832 STATE OF IDAHO KEYVIN LILLY 5-14-14				SANITARY SEWER MANHOLE			
				CITY OF MOSCOW ENGINEERING DEPARTMENT			
				DRAWING NUMBER: 22			



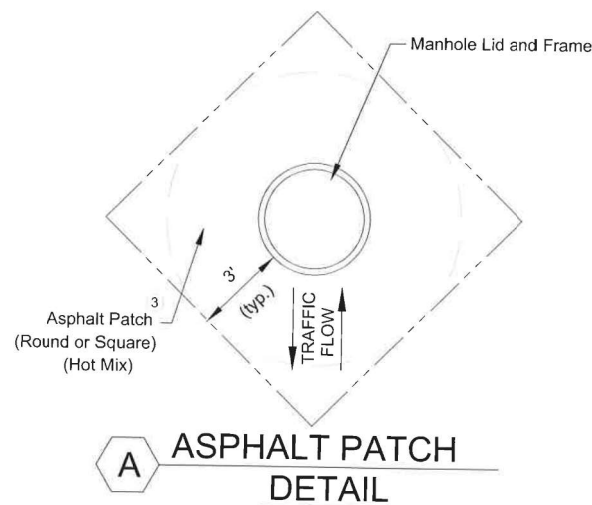
SECTION 1
NTS



SECTION 2
NTS

NOTES:

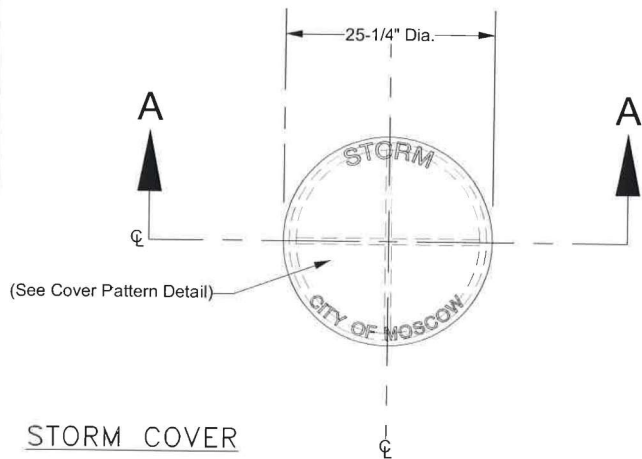
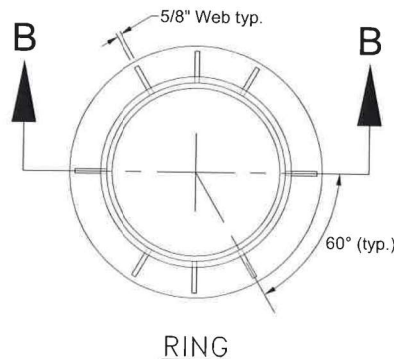
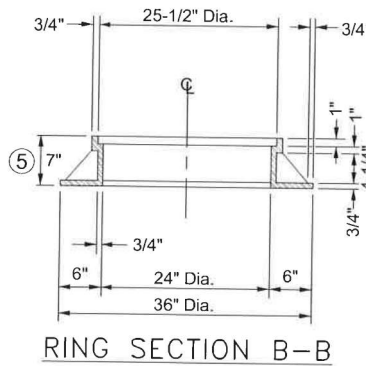
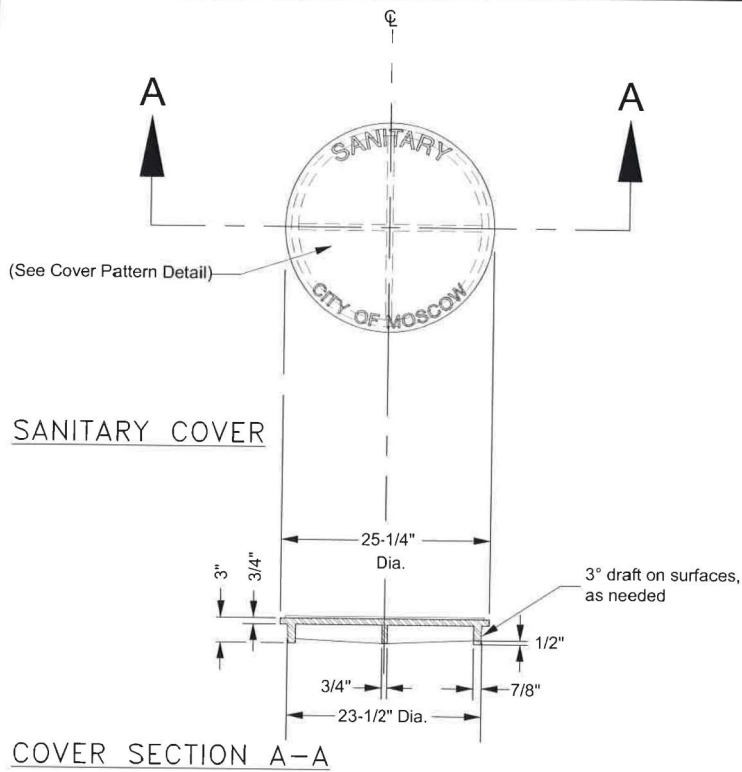
1. Manholes shall be constructed watertight- test per Standard Construction Specification.
2. Steps shall not be installed in the manholes.
3. Manholes located in paved areas shall have asphaltic patch four inches (4") thick placed in two lifts to exact line and grade of street. Manhole ring shall be quarter inch (1/4") below finished patch.
4. Manholes located in gravel streets or alleys shall have lid adjusted to two inches (2") below gravel surface.
5. All cast-in-place conc. shall be troweled smooth.
6. Manufactured watertight manhole couplers are required at all pipe penetrations.
7. Contractor shall comply with the most current OSHA requirements for excavations.
8. Seal between riser and cone, riser and riser, and riser and frame with two parallel three-eighths of an inch (3/8") diameter beads of silicone sealant.
9. Backfill around manholes shall be Class 'D' for all roadways and alleys; Class 'A' for all other locations unless specifically allowed or directed otherwise by the City Engineer.
10. City standard manhole ring and cover; a 4.5" traffic rated ring and lid will be allowed with approval from City Engineer.
11. Type D manholes shall comply with the Standard Construction Drawing for Manhole Base Details.



REVISIONS		SIGNED AND DATED		DRAFTED BY:		CHECKED BY:		DRAWING SCALE:		DATE:	
DATE	DESCRIPTION			RHBIII/KWK	K.Lilly	NTS	3-3-2014				
				SHALLOW SANITARY MANHOLE CITY OF MOSCOW ENGINEERING DEPARTMENT							
DRAWING NUMBER:				23							

NOTES:

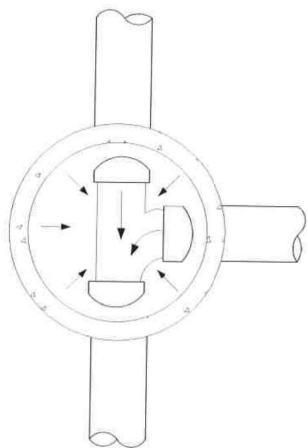
1. Raised letters are Sharp Face Gothic font; 2.5" for "SANITARY" and "STORM," 1.5" for "CITY OF MOSCOW." Center word about center line.
2. Cast covers of Grey Cast Iron; ASTM A48 Class 138.
3. All covers shall be interchangeable within the dimensions shown. All mating surfaces shall be machine finished to ensure a non-rocking fit. The inside vertical recessed face of the ring and the vertical outside edge of the cover shall be machined or manufactured to the following tolerances:
 Ring - +3/32 inch to -3/32 inch
 Cover - +3/32 inch to -3/32 inch
4. Rings (traffic rated) of lesser height may be used in special circumstances, as allowed by the City Engineer.



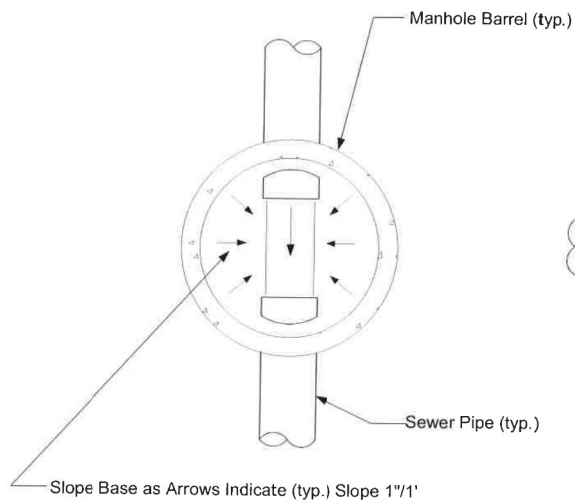
STORM & SANITARY MANHOLE RING & COVER CITY OF MOSCOW ENGINEERING DEPARTMENT		DRAFTED BY: CEE/KWK CHECKED BY: K. Lilly DRAWING SCALE: NTS DATE: 3-4-2014	SIGNED AND DATED 		REVISIONS	
					DATE	DESCRIPTION
DRAWING NUMBER: 24						

Note:

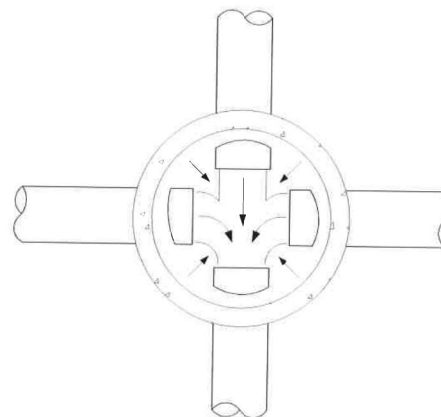
All channels to be "U" shaped (See Channel X-Section)



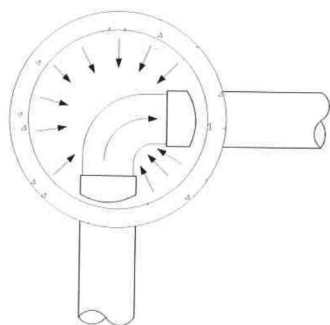
TYPE A



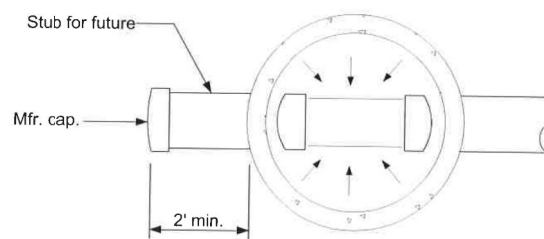
TYPE B



TYPE C

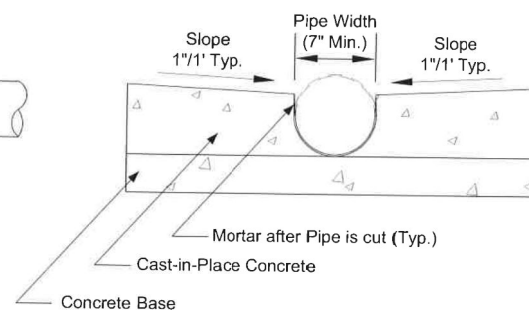


TYPE D



TYPE E

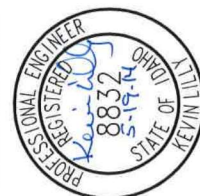
For Dead End Line



CHANNEL X-SECTION

REVISIONS	
DATE	DESCRIPTION

SIGNED AND DATED



DRAFTED BY:
CEE/KWK

CHECKED BY:
K. Lilly

DRAWING SCALE:
NTS

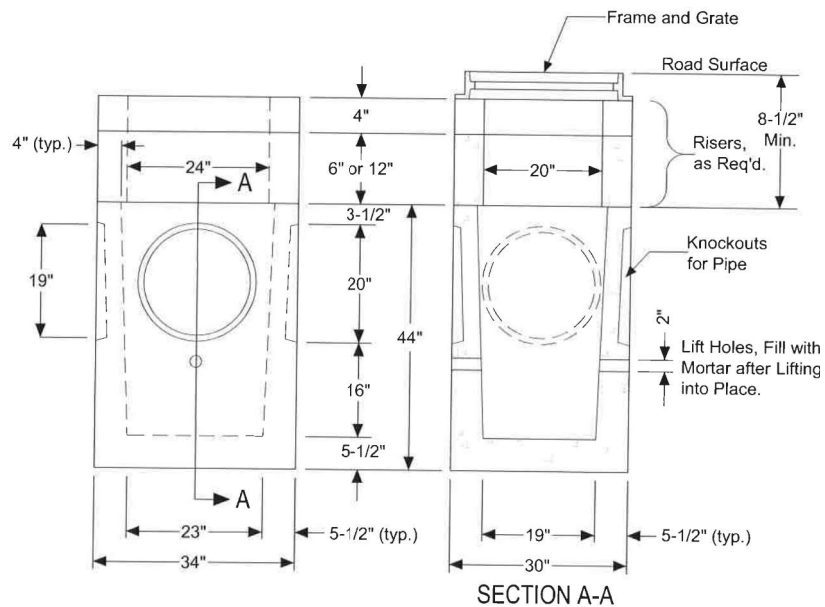
DATE: 3-4-2014

**MANHOLE BASE
DETAILS**

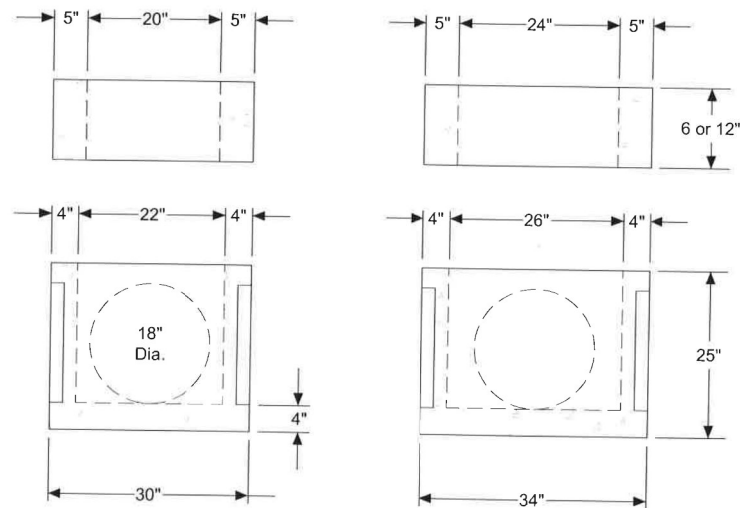
CITY OF MOSCOW
ENGINEERING DEPARTMENT

DRAWING NUMBER:

25



CATCH BASIN

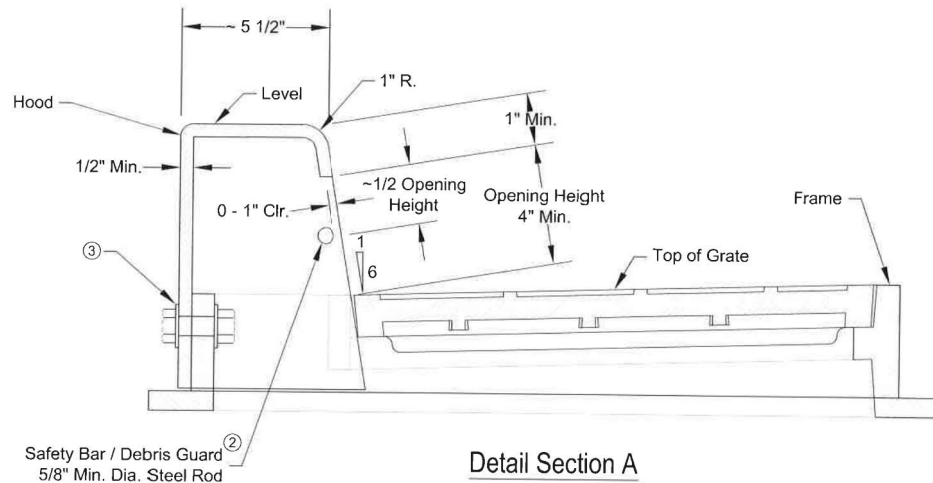


CATCH INLET

NOTES:

- Catch Basins shall be used in all City streets, City parking lots, and City alleys for catchment and conveyance of surface runoff. Catch Inlets are not to be used in these locations unless specifically allowed by the City Engineer.
- Catch Basin shall be precast concrete per WSDOT Catch Basin Type 1 and Catch Inlets per WSDOT Concrete Inlet, unless otherwise approved by the City Engineer.
- Catch Basins located in paved areas shall have asphaltic patch four inches (4") thick (in two lifts) restoring surface to original line and grade. (see note 6)
- Catch basins located in gravel streets or alleys shall have grate adjusted two inches (2") below gravel surface.
- All pipes shall protrude 1"-2" into the basin and shall be neatly mortared all around (inside and outside). Exit pipe to manhole or storm main shall have 1'-6" minimum cover.
- Catch Basins shall be set 0.10 foot lower than adjoining street grade.
- All materials shall be manufactured in the U.S.A.
- Catch Basins and Inlets shall be pre-cast concrete conforming to AASHTO M199 or ASTM C478, as shown.
- Catch Basins and Inlets shall be backfilled to grade as per adjoining pipe trench backfill.
- Catch Inlets may only be used as a 'bubbler', area drain, or where clearance over some particular obstacle is necessary and if approved by the City Engineer.
- Frames and Grates shall be as per the Catch Basin & Catch Inlet Gates and/or the Combination Inlet Standard Drawing.

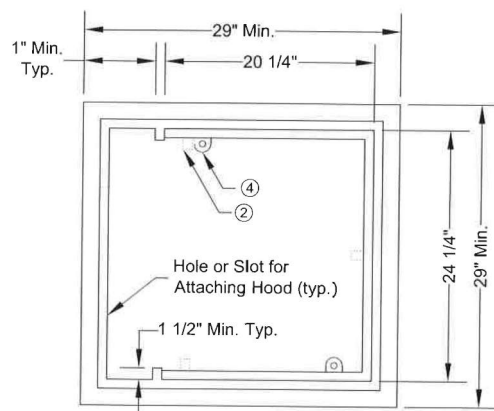
REVISIONS		SIGNED AND DATED	DRAFTED BY: MASKWK	CHECKED BY: K.Lilly	DRAWING SCALE: NTS	DATE: 3-4-2014
DATE	DESCRIPTION					
			CATCH BASIN & CATCH INLET CITY OF MOSCOW ENGINEERING DEPARTMENT			
DRAWING NUMBER:		26				



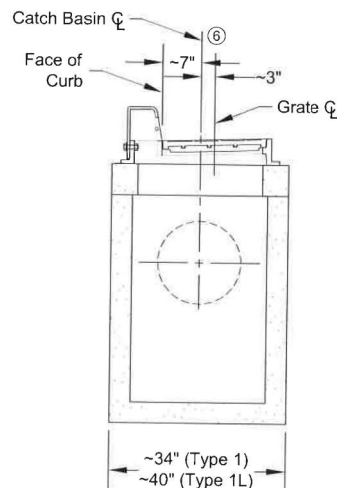
Detail Section A

NOTES:

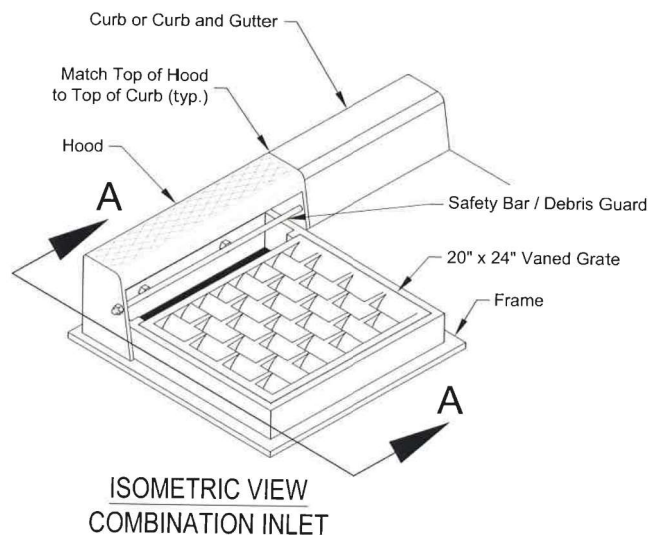
1. Curb and Gutter Pan design as per WSDOT Combination Inlet.
2. The dimensions of the Frame and Hood may vary slightly among different manufacturers. The Frame may have cast features intended to support a grate guard. Hood units shall mount outside of the Frame. The methods for fastening the Safety Bar / Debris Guard to the Hood may vary. The Hood may include casting lugs. The top of the Hood may be cast with a pattern.
3. Attach the Hood to the frame with two 3/4" x 2" hex head bolts, nuts, and oversize washers. The washers shall have diameters adequate to assure full bearing across the slots.
4. When bolt-down grates are specified, provide two holes in the frame that are vertically aligned with the grate slots. Tap each hole to accept 5/8" x 11 NC x 2" hex head cap screws. Location of bolt-down holes varies among different manufacturers. See BOLT-DOWN DETAIL, WSDOT Standard Plan B-30.10.
5. This plan is intended to show the installation details of a manufactured product. It is not the intent of this plan to show the specific details necessary to fabricate the castings shown on this drawing.
6. The asymmetry of the Combination Inlet shall be considered when calculating the offset distance for the catch basin. See SECTION A.



FRAME DETAIL
TOP VIEW



SECTION A

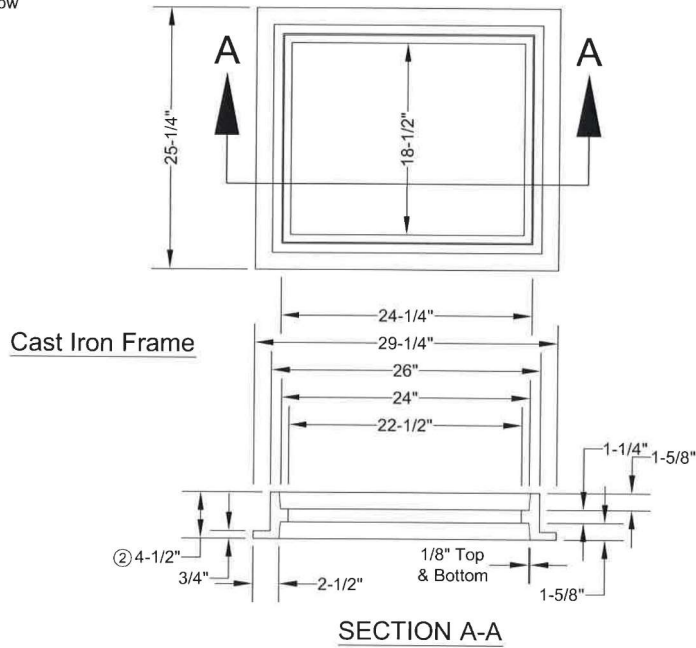


ISOMETRIC VIEW
COMBINATION INLET

COMBINATION INLET CITY OF MOSCOW ENGINEERING DEPARTMENT		DRAFTED BY: C. Edwards CHECKED BY: K. Lilly DRAWING SCALE: N.T.S. DATE: 3-4-2014	SIGNED AND DATED		REVISIONS	
			DATE	DESCRIPTION		
DRAWING NUMBER: 27b						

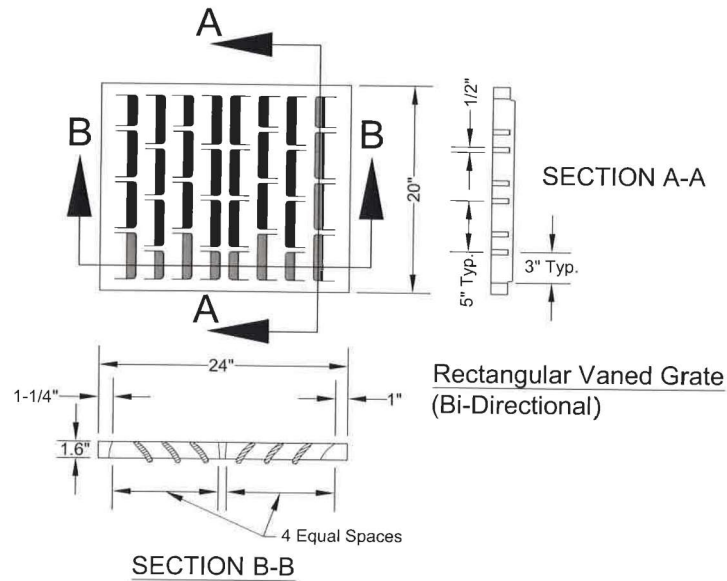
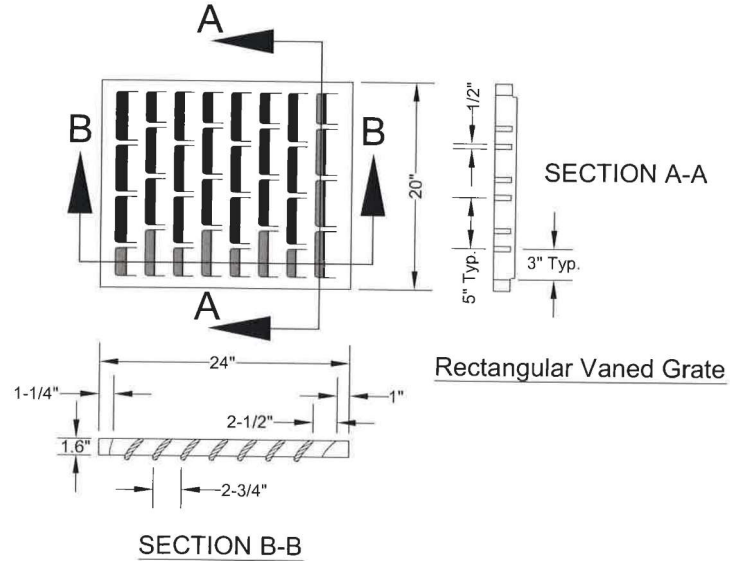
NOTE:

Vanes to be placed towards origin of water flow



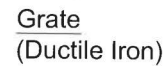
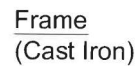
NOTES:

1. Standard Frame and Grate as per WSDOT Rectangular Frame and Rectangular Grate.
2. A 2-1/8" riser is also available.
3. All pipes shall protrude 1"-2" into the inlet and shall be neatly mortared all around (inside and outside). Exit pipe shall have 1.5 foot min. cover.
4. Inlet grates and catch basins in paved areas shall be set one-tenth of a foot (0.10') lower than adjacent ground elevation.
5. All materials shall be manufactured in the U.S.A.
6. Type "A" grate required in all installations unless specifically allowed otherwise by the City Engineer.
7. Catch basins located in unpaved streets, alleys, or landscaped area shall have grate adjusted two inches (2") below gravel surface.
8. All basins, frames, and grates shall be rated for heavy traffic loading.
9. Rectangular solid metal cover may be used at junction points where grate is not necessary.



REVISIONS	DATE	DESCRIPTION	SIGNED AND DATED	DRAFTED BY:	CHECKED BY:	DRAWING SCALE:	DATE:
				CEE/KWK	K. Lilly	N.T.S.	3-4-2014
CATCH BASIN & INLET TYPE 'A' GRATE				CITY OF MOSCOW ENGINEERING DEPARTMENT			
DRAWING NUMBER:				27c			

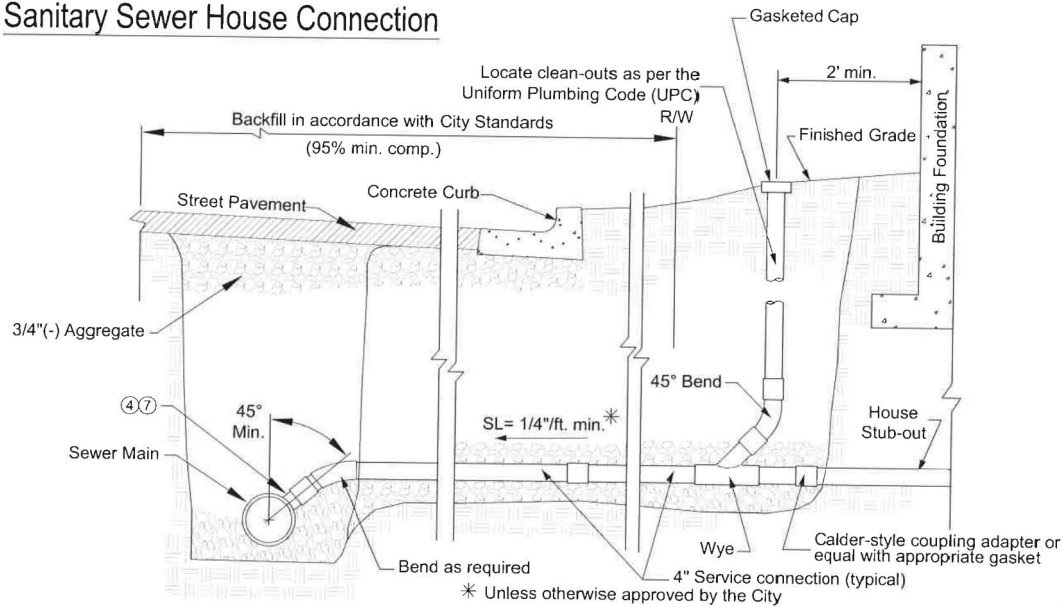
Vanes to be placed towards origin of water flow



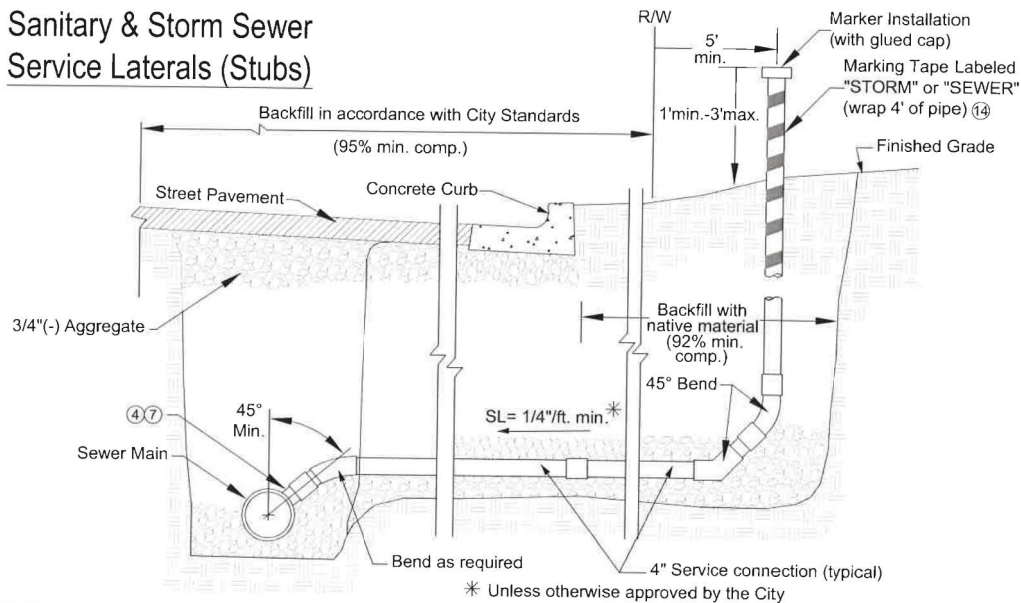
1. All pipes shall protrude 1"-2" into the inlet and shall be neatly mortared all around (inside and outside). Exit pipe shall have 1.5 foot min. cover.
2. Inlet grates and catch basins in paved areas shall be set one-tenth of a foot (0.10') lower than adjacent ground elevation.
3. All materials shall be manufactured in the U.S.A.
4. Catch basins located in unpaved streets, alleys, or landscaped areas shall have grate adjusted two inches (2") below gravel surface.
5. All basins, frames, and grates shall be rated for heavy traffic loading.

CATCH BASIN & INLET TYPE 'B' GRATE (Rolled Curb)	CITY OF MOSCOW ENGINEERING DEPARTMENT	DRAFTED BY: MAS/KWK	SIGNED AND DATED 	REVISIONS	
		CHECKED BY: K.Lilly		DATE	DESCRIPTION
		DRAWING SCALE: N.T.S.			
		DATE: 2-2-2012			
DRAWING NUMBER: 27d					

Sanitary Sewer House Connection



Sanitary & Storm Sewer Service Laterals (Stubs)



NOTES:

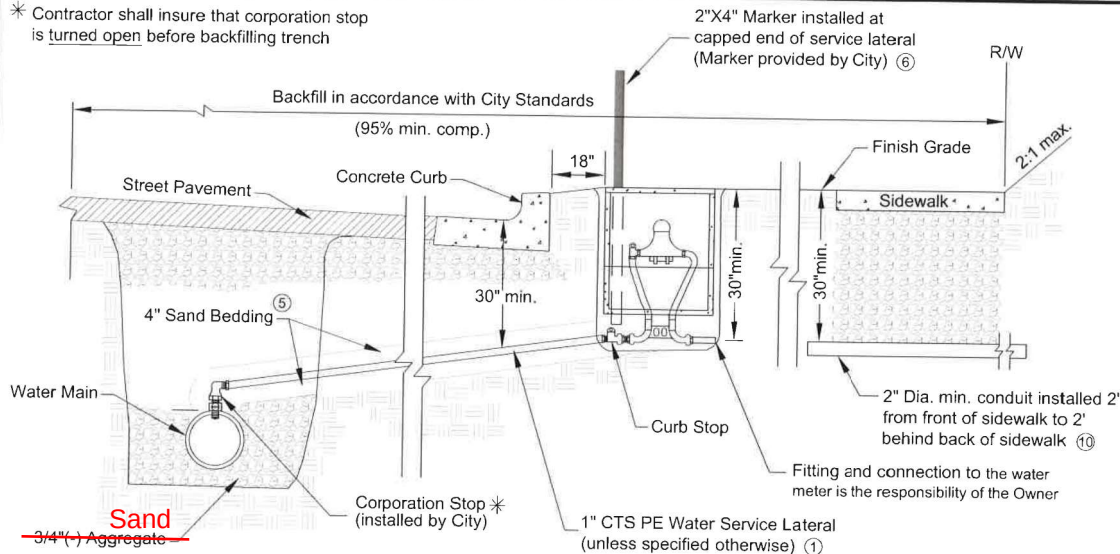
1. Pipe materials shall be as follows:
 - a. Within public right-of-way: SDR 35 PVC, (ASTM D-3034), with integral gasketed bell and spigot joints.
 - b. From right-of way to within two feet (2') of the house: SDR 35 PVC, (ASTM D-3034), with integral gasketed bell and spigot joints or Schedule 40 ABS plastic pipe with glued fittings.

If the water service line and sanitary or storm drain service lines from the right-of-way to the house are installed in the same trench, the piping material shall be Schedule 40 ABS with glued fittings unless all three of the following requirements are met:

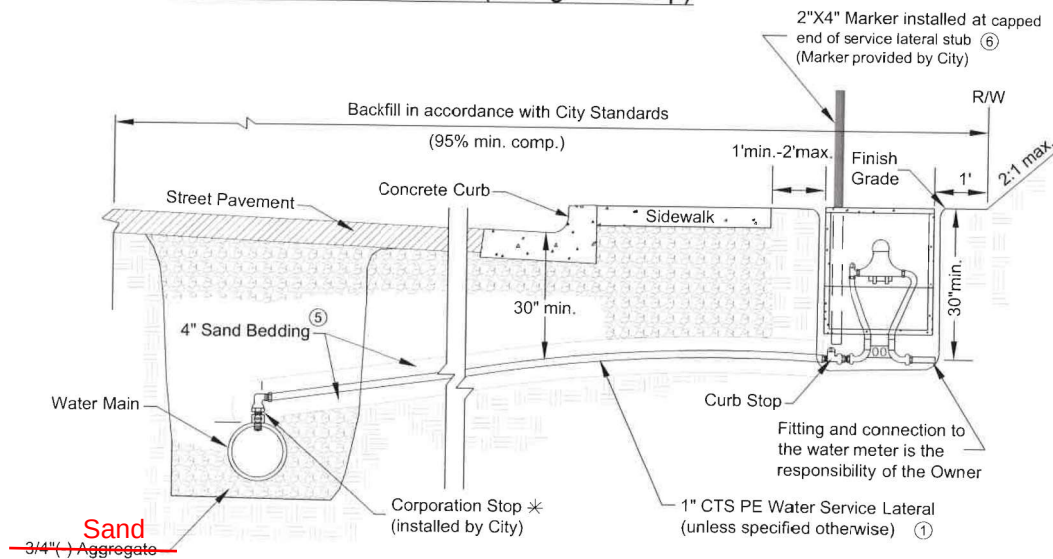
- a. The bottom of the water pipe, at all joints, shall be at least twelve inches (12") above the top of the sanitary or storm drain service line.
- b. The water pipe shall be placed on a solid shelf, excavated at one side of the common trench, with a minimum clear horizontal distance of at least twelve inches (12") from the sanitary or storm drain service line.
- c. Where the sanitary or storm drain line crosses the water service line, the top of the sanitary or the storm drain line is a minimum of twelve inches (12") below the water service line.
2. Trench bottom to be prepared, as required, for a firm bed.
3. Existing sewer mains shall be tapped by the City, at the Owner's expense.
4. Sewer service laterals shall be connected to the new mains with manufactured wyes. Connection to existing mains require ROMAC 'CB' saddles, or equivalent.
5. Owner to obtain the necessary permits from the Moscow Community Development Department and Public Works Department.
6. This work shall comply with the Uniform Plumbing Code (UPC).
7. Sewer services shall connect to the sanitary sewer main at a point above the centerline of the pipe.
8. Construction to be inspected by the City.
9. Sanitary service laterals (stubs) shall be air tested with the sanitary sewer main.
10. All backfill under sidewalks shall be crushed aggregate. (95% minimum compaction)
11. The service lateral (from main to house) shall be bedded in sand or 3/4"(-) crushed aggregate; from two inches (2") under the pipe to two inches (2") over the pipe.
12. SANITARY service laterals shall be green pipe from the main to the house, including stub outs and markers.
13. STORM service laterals shall be white pipe from the main to the house, including stub outs and markers.
14. Marking tape shall be three inch (3") wide commercially manufactured, and labeled "STORM DRAIN" for storm sewer and "SEWER" for sanitary sewer use.
15. Storm drain and sanitary sewer services (private) located within public street right-of-way or public utility easements shall have a 2.5' minimum burial depth unless specifically allowed otherwise by the City Engineer.

SANITARY & STORM SEWER SERVICE CONNECTIONS	CITY OF MOSCOW ENGINEERING DEPARTMENT	DRAFTED BY: KWK	SIGNED AND DATED 	REVISIONS	
		CHECKED BY: K. Lilly		DATE	DESCRIPTION
		DRAWING SCALE: NTS			
		DATE: 2-3-2012			
DRAWING NUMBER: 28					

* Contractor shall insure that corporation stop is turned open before backfilling trench



Water Meter Connection (with green strip)



Water Meter Connection (no green strip)

* Contractor shall insure that corporation stop is turned open before backfilling trench

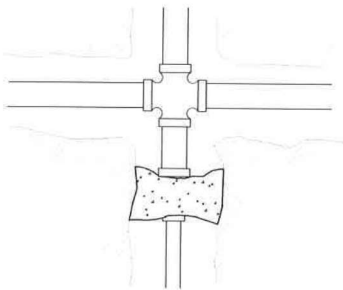
NOTES:

1. Pipe and fittings, from the water main to the curb stop, will be supplied by the City.
2. Water main shall be tapped by the City.
3. Trench bottom to be prepared, as required, for a firm bed.

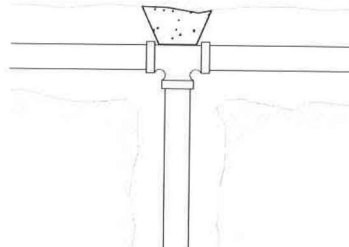
If the water service line and sanitary or storm drain service lines, from the right-of-way to the house, are installed in the same trench, then all three of the following requirements shall be met:

 - a. The bottom of the water pipe, at all joints, shall be at least twelve inches (12") above the top of the sanitary or storm drain service lines.
 - b. The water pipe shall be placed on a solid shelf, excavated at one side of the common trench, with a minimum clear horizontal distance of at least twelve inches (12") from the sanitary or storm drain service line.
 - c. Where the sanitary or storm drain line crosses the water service line, the top of the sanitary or the storm drain line is a minimum of twelve inches (12") below the water service line.
4. The roadway subgrade shall be established prior to the installation of the water service laterals.
5. The water service lateral shall be bedded in sand or pea gravel from four inches (4") under the pipe to four inches (4") over the pipe.
6. After the installation of the water service lateral, a 2"X4" wooden marker shall be placed at the capped end of the curb stop. The marker will be provided by the City. It shall be the responsibility of the Contractor to install, maintain, and protect the marker.
7. The capped curb stop shall be located eighteen inches (18") beyond the back of curb, if placed in the green strip, and one foot (1') minimum to two feet (2') maximum beyond the back of sidewalk, if sidewalk is installed next to the curb.
8. The capped curb stop shall be buried to a minimum depth of thirty inches (30") from finished grade elevation.
9. The water service lateral and curb stop shall be installed perpendicular to either the curb or the sidewalk.
10. When water meter is located in the green strip, a two inch (2") minimum diameter conduit shall be installed extending two feet (2') from the front of the sidewalk to two feet (2') behind the back of sidewalk.
11. Pipe installation shall be inspected by the City before the trench is backfilled.
12. Owner to obtain the necessary permits from the Moscow Community Development Department and Public Works Department.
13. The Owner's work shall comply with the Uniform Plumbing Code (UPC).
14. All backfill under sidewalks shall be 3/4"(-) crushed aggregate (95% min. compaction).

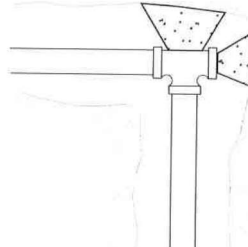
WATER SERVICE CONNECTIONS CITY OF MOSCOW ENGINEERING DEPARTMENT	DRAFTED BY: KWK	SIGNED AND DATED 	REVISIONS	
	CHECKED BY: K. Lilly		DATE	DESCRIPTION
	DRAWING SCALE: NTS			
	DATE: 3-5-2014			
DRAWING NUMBER: 29				



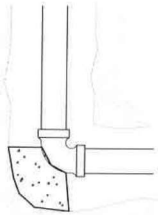
CROSS WITH REDUCER



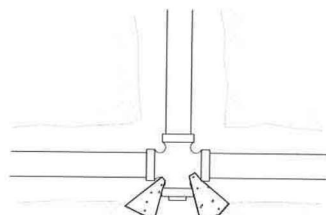
TEE



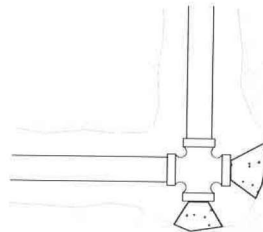
TEE WITH PLUG



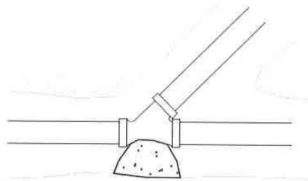
90° ELBOW



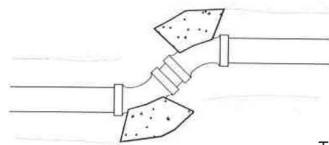
CROSS WITH PLUG



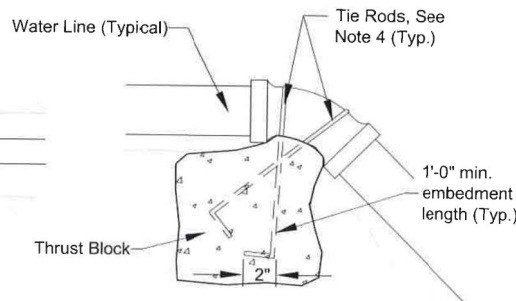
CROSS WITH 2 PLUGS



WYE



11-1/4°, 22-1/2°
OR 45° BENDS



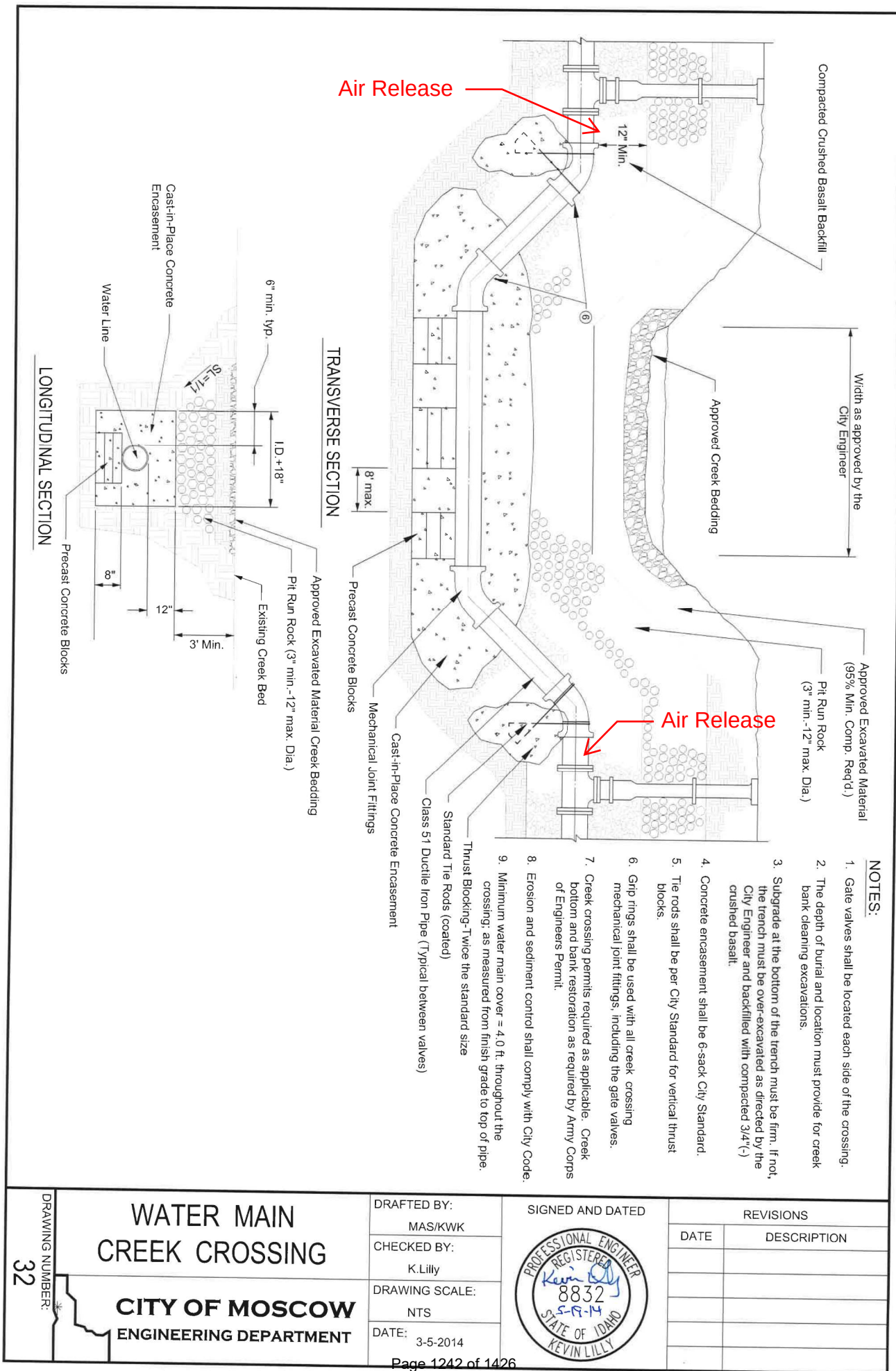
VERTICAL DOWN BENDS

Size of Pipe	THRUST BLOCK SIZE				
	Horizontal Bends				
	Sq. Feet of Bearing on Undisturbed Earth				
	Tees & Deadends	90°	45°	22 1/4°	Vertical Down Bends Cu.Yds.
4"	2	3	1-1/2	1	1/2
6"	4	5-1/2	3	1-1/2	1/2
8"	7	9-1/2	5	2-1/2	1
10"	11	15	8-1/2	4	1-1/2
12"	15-1/2	22	12	6	2
16"	21	27	21	11	2-1/2

NOTES:

1. Thrust blocking for water mains shall be, as a minimum, the size indicated in the above Table.
2. Concrete shall be from a commercial source and be a minimum of 5-sack mix or ITD Class 22.
3. Concrete shall not be allowed in joints or in contact with pipes. Protect with plastic or paper sheeting prior to placing concrete.
4. Tie rods shall be 3/4" minimum diameter steel; coat tie rods with bituminous coating or approved equal. Hook (2" min.) all embedded ends.
5. The minimum distance between the fitting and excavated bank shall be three (3) pipe diameters.
6. Thrust blocks shall be cast against firm, undisturbed earth, as approved by the City Engineer.
7. Thrust blocks must be inspected by the City prior to backfill.
8. Thrust blocks for vertical up bends shall correspond to the requirements of horizontal bends.

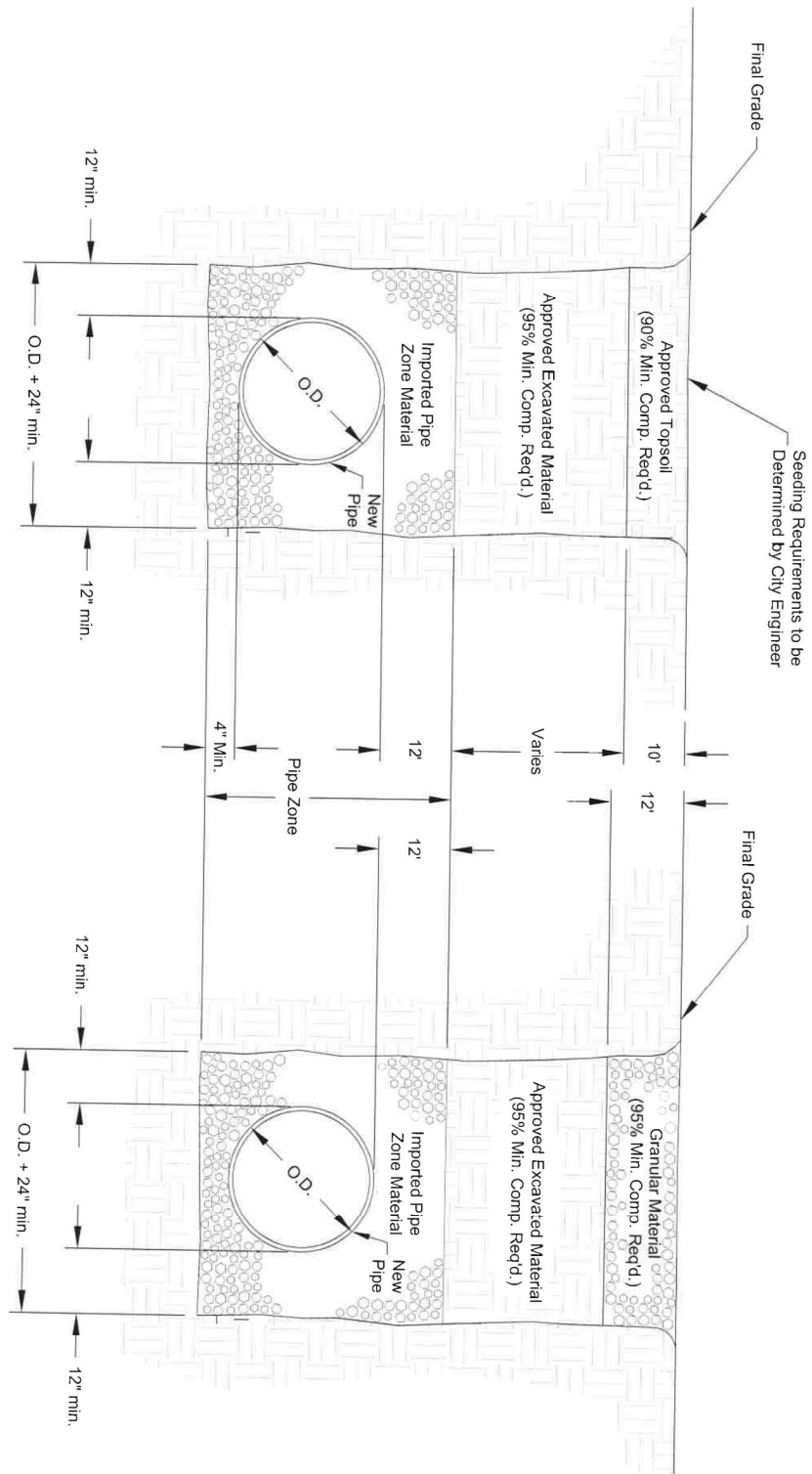
REVISIONS		SIGNED AND DATED	
DATE	DESCRIPTION		
DRAFTED BY: RKC/KWK	CHECKED BY: K. Lilly	DRAWING SCALE: N.T.S.	DATE: 2-6-2012
WATER MAIN THRUST BLOCKING		CITY OF MOSCOW ENGINEERING DEPARTMENT	
DRAWING NUMBER: 31			



NOTES:

1. Gate valves shall be located each side of the crossing.
2. The depth of burial and location must provide for creek bank cleaning excavations.
3. Subgrade at the bottom of the trench must be firm. If not, the trench must be over-excavated as directed by the City Engineer and backfilled with compacted 3/4" crushed basalt.
4. Concrete encasement shall be 6-sack City Standard.
5. The rods shall be per City Standard for vertical thrust blocks.
6. Grip rings shall be used with all creek crossing mechanical joint fittings, including the gate valves.
7. Creek crossing permits required as applicable. Creek bottom and bank restoration as required by Army Corps of Engineers Permit.
8. Erosion and sediment control shall comply with City Code.
9. Minimum water main cover = 4.0 ft. throughout the crossing, as measured from finish grade to top of pipe.

WATER MAIN CREEK CROSSING CITY OF MOSCOW ENGINEERING DEPARTMENT		DRAFTED BY: MAS/KWK	SIGNED AND DATED 	REVISIONS	
		CHECKED BY: K.Lilly		DATE 3-5-2014	DATE
DRAWING NUMBER: 32		DRAWING SCALE: NTS			



NOTES:

1. Class 'A' Backfill shall be used in areas where there is to be re-vegetation and some trench settlement may be tolerated.
2. Class 'B' Backfill may not be constructed within the public right-of-way and has limited application - refer to the City's Standard Construction Specifications.
3. Contractor shall comply with the most current OSHA requirements for excavations.
4. Backfill shall comply with the requirements of the City's Standard Construction Specifications.

BACKFILL CLASS A TYPICAL SECTION

BACKFILL CLASS B TYPICAL SECTION

REVISIONS	
DATE	DESCRIPTION

SIGNED AND DATED



DRAFTED BY:
K.Kipp/C.Edwards

CHECKED BY:
K.Lilly

DRAWING SCALE:
NTS

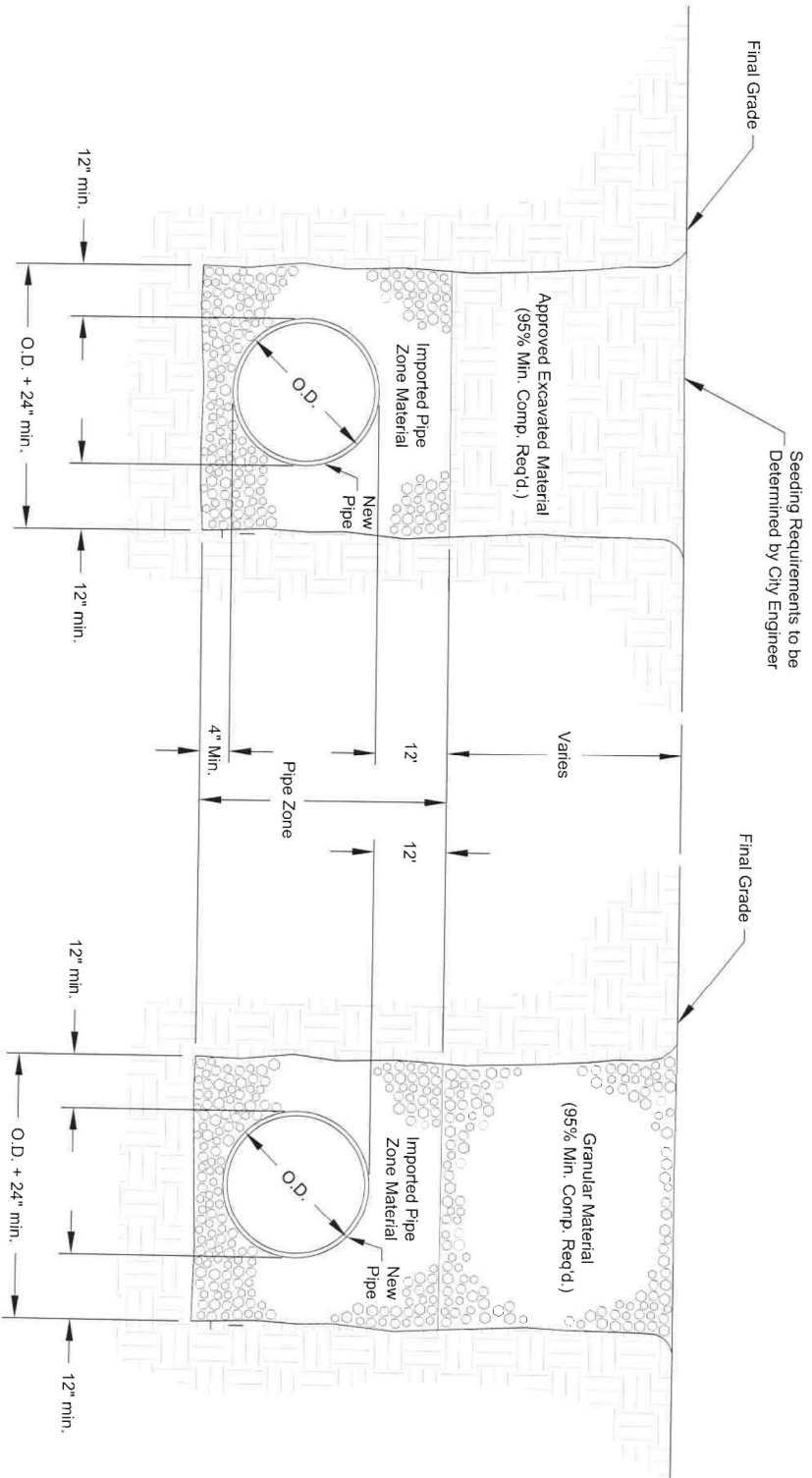
DATE: 3-5-2014

BACKFILL
CLASS A & B

CITY OF MOSCOW
ENGINEERING DEPARTMENT

DRAWING NUMBER:

33a



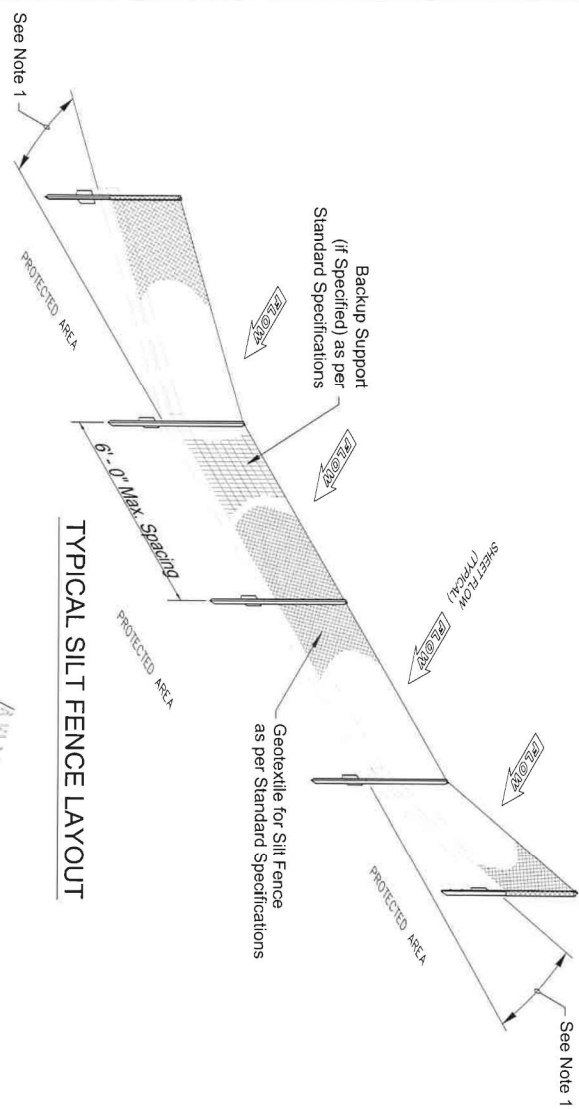
NOTES:

1. Class 'C' Backfill shall be used in areas where asphalt pavement, concrete curb, sidewalk, driveway, or gravel surfacing is not anticipated and where topsoil is not required.
2. Class 'D' Backfill is for areas where asphalt pavement, concrete, curb, sidewalk, or gravel surfacing is existing or anticipated.
3. Contractor shall comply with the most current OSHA requirements for excavations.
4. Backfill shall comply with the requirements of the City's Standard Construction Specifications.

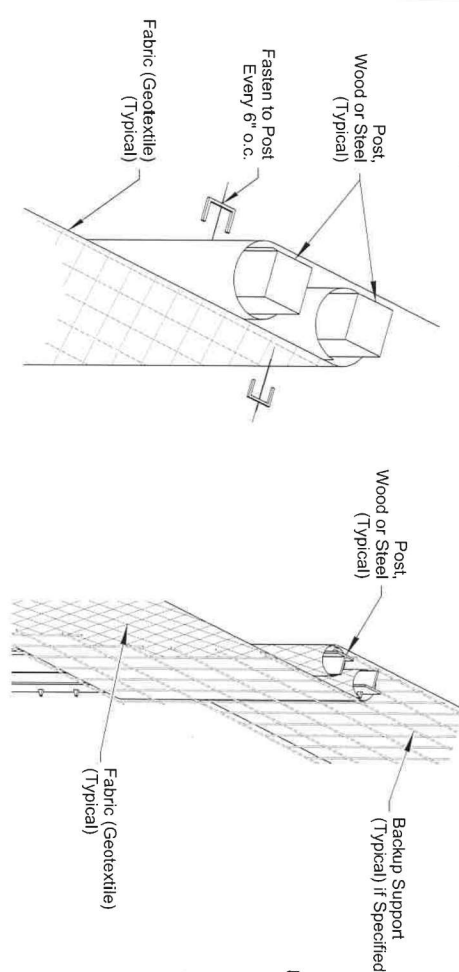
**BACKFILL CLASS C
TYPICAL SECTION**

**BACKFILL CLASS D
TYPICAL SECTION**

BACKFILL CLASS C & D CITY OF MOSCOW ENGINEERING DEPARTMENT	DRAFTED BY: K.Kipp/C.Edwards	SIGNED AND DATED 	REVISIONS	
	CHECKED BY: K.Lilly		DATE 3-5-2014	DATE
DRAWING NUMBER: 33b	DRAWING SCALE: NTS			

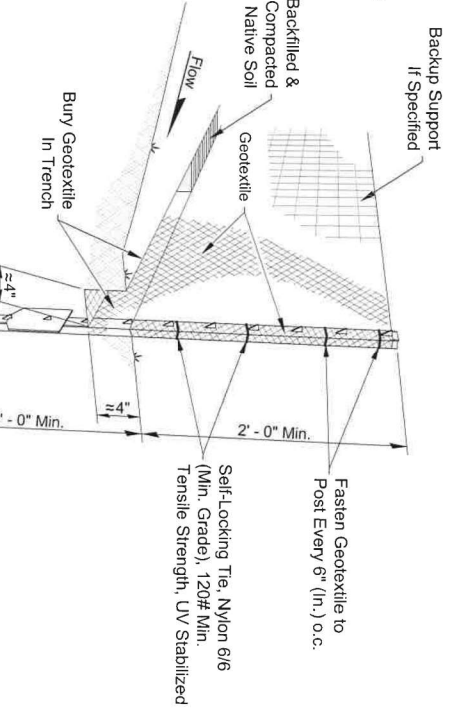


TYPICAL SILT FENCE LAYOUT



SPICE DETAIL

(WOOD POSTS AND NO BACKUP SUPPORT SHOWN)



SPICE DETAIL

(STEEL POSTS AND BACKUP SUPPORT SHOWN)

TYPICAL INSTALLATION DETAIL

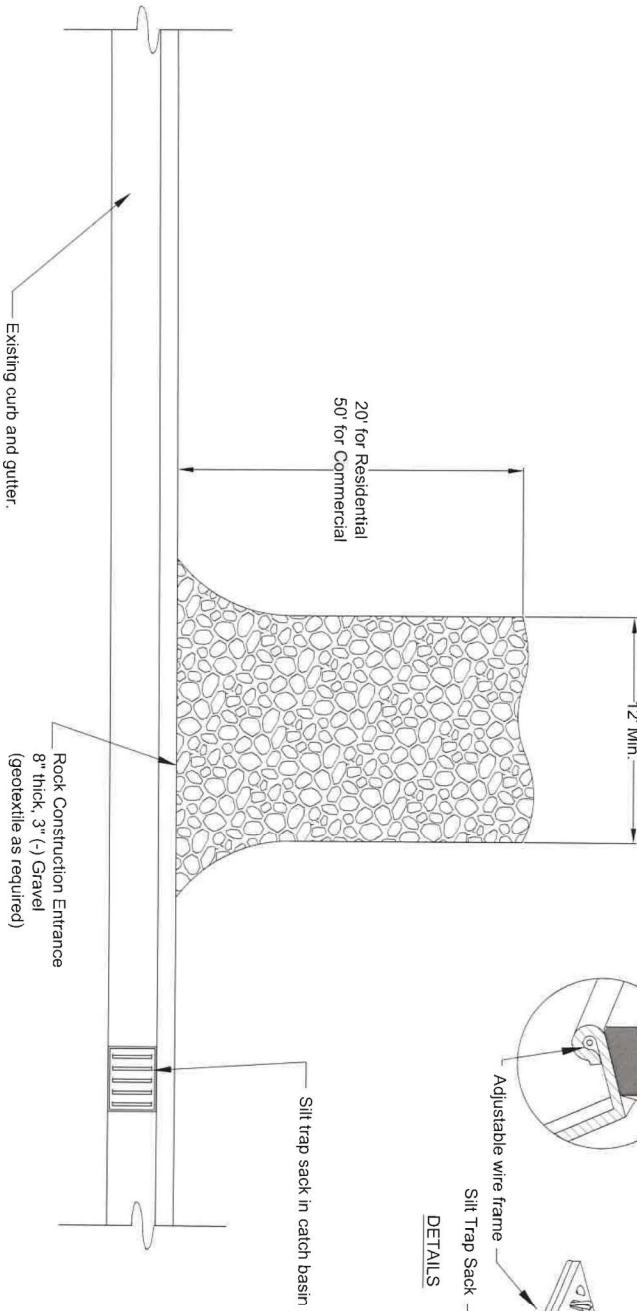
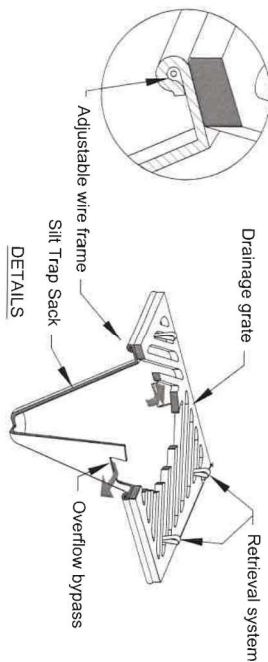
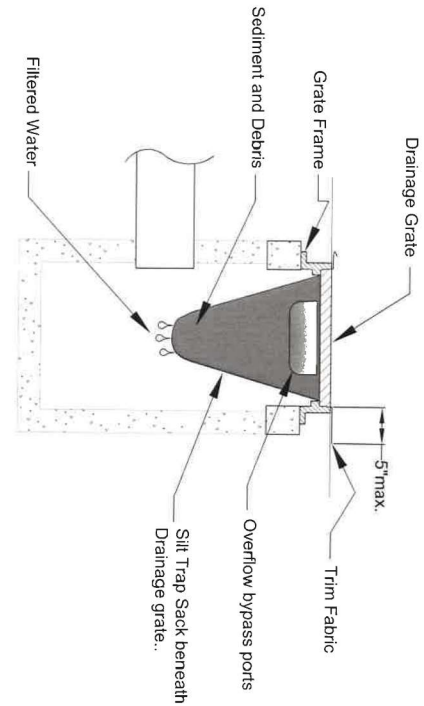
NOTES:

1. Install ends of silt fence slightly up slope to prevent sediment from flowing past ends of fence. See Typical Silt Fence Layout.
2. Overlap vertical silt fence splices eight inches (8") minimum and construct in a manner to prevent silt laden runoff from passing between posts. Avoid placing splices at sumps and other low points.
3. Do not install silt fence in a manner that it will act as a dam across permanent flowing watercourses. Silt fences are to be used at upland locations and turbidity barriers used at permanent bodies of water.
4. If backup support is specified, attach fabric to backup support in a manner to hold fabric securely and reduce the potential of tearing.
5. During excavation, minimize ground disturbance around anchor trench and smooth surface to prevent concentrated flows. Compact backfill in trench in a manner that will prevent underflow.

SILT FENCE CITY OF MOSCOW ENGINEERING DEPARTMENT	DRAFTED BY: C. Edwards	SIGNED AND DATED PROFESSIONAL ENGINEER REGISTERED 8832 5-19-14 STATE OF IDAHO KEVIN LILLY	REVISIONS	
	CHECKED BY: K. Lilly		DATE	DESCRIPTION
DRAWING SCALE: NTS	DATE: 3-5-2014			
DRAWING NUMBER: 35	Page 1247 of 1426			

NOTES:

1. The size and shape of the silt trap sack to fit the storm structure it will service (rectangular or round).
2. The silt trap sack shall have a built-in high-flow relief system (overflow bypass).
3. The silt trap sack assembly must allow removal without spilling the collected material.
4. Empty silt trap sack and dispose of sediment and debris before the sack is half-full.
5. Ensure the silt trap sack assembly does not spill or fall into the storm structure. If sediment is spilled into the storm structure, remove the spilled material by suction hose or other approved method.
6. Construction entrances should be inspected regularly for signs of thinning areas where mud begins to show through. Add gravel periodically to maintain the integrity of the pad.



**CONSTRUCTION ENTRANCE
& INLET PROTECTION**

CITY OF MOSCOW
ENGINEERING DEPARTMENT

DRAFTED BY:
C. Edwards

CHECKED BY:
K. Lilly

DRAWING SCALE:
NTS

DATE: 3-5-2014

SIGNED AND DATED



REVISIONS

DATE	DESCRIPTION

DRAWING NUMBER:

36

APPENDIX 'B'

- *Geotechnical Engineering Evaluation
Booster Station Replacement -Phase II*

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May 29, 2020
File: MO17274A

Mr. Cory Baune, P.E. &
Ms. Michelle Johnson, P.E.
J-U-B Engineers, Inc.
201 South Jackson Street
Moscow, Idaho 83843

RE: **Geotechnical Engineering Evaluation**
Proposed Moscow Booster Pump Stations – Phase II
Moscow, Idaho

Greetings, Cory & Michelle.

GeoProfessional Innovation Corporation (GPI) performed the authorized geotechnical engineering evaluation for the planned Moscow Booster Pump Stations – Phase II project. This project includes 2 separate sites; designated the *Indian Hills* and *Ponderosa* sites. Our geotechnical engineering evaluation's purpose was to explore the subsurface conditions within both of the anticipated improvement areas and provide geotechnical recommendations to assist J-U-B Engineers, Inc. (J-U-B) in project planning, design, and construction.

The following text provides specific recommendations for preparing subgrades, performing earthwork activities, foundation design, construction, as well as other geotechnical-related project aspects. Read this report and implement it entirely. Portions of the report cannot be relied upon individually without the supporting text of remaining sections, appendices, and plates. Our opinion is the success of the proposed improvements will depend on following report recommendations, good construction practices, and providing the necessary construction testing and consultation to verify that work has been constructed as recommended. GPI stands ready to assist J-U-B and the City of Moscow (City) in confirming the geology exposed during excavation and documenting our recommendations are incorporated into construction

We appreciate the opportunity to continue our professional relationship with J-U-B and the potential to assist the design and construction team. We look forward to our continued involvement on this project as design advances and stand ready to assist as necessary. Please contact us if you have any questions or comments.

Sincerely,
GPI


Justin Maffey, E.I.
Project Engineer


Andrew J. Abrams, P.E.
Senior Engineer



AJA/ac

Geotechnical Engineering Evaluation
Proposed Moscow Booster Pump Stations – Phase II
Indian Hills & Ponderosa Stations
Moscow, Idaho

PREPARED FOR:

Mr. Cory Baune, P.E.
Ms. Michelle Johnson, P.E.
J-U-B Engineers, Inc.
201 South Jackson Street
Moscow, Idaho 83843



PREPARED BY:

GeoProfessional Innovation Corporation
6 O'Donnell Road
Pullman, Washington 99163
Phone: 509-339-2000
Facsimile: 509-339-2001

May 29, 2020

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Plate 3:	Foundation Drain Schematic
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Appendix B:	Laboratory Test Results

Geotechnical Engineering Evaluation
Proposed Moscow Booster Stations – Phase II
Indian Hills & Ponderosa Stations
Moscow, Idaho

INTRODUCTION

GeoProfessional Innovation Corporation (GPI) accomplished the authorized geotechnical engineering evaluation for the Moscow Booster Pump Stations – Phase II project. This project includes 2 separate sites; designated the *Indian Hills* and *Ponderosa* sites. The Indian Hills site is located off of Southview Avenue and the Ponderosa site is located southeast of the Lanny Lane and Orchard Avenue intersection in Moscow, Idaho. GPI explored subsurface conditions in the anticipated improvement areas at each site and prepared these geotechnical recommendations to assist J-U-B Engineers, Inc. (J-U-B) and the City of Moscow (City) in project planning, design, and construction. We performed our services referencing the authorized geotechnical scope dated October 31, 2017. The following tasks were advanced to fulfill the geotechnical scope:

1. Coordinated exploration with the Idaho Dig Line and J-U-B prior to initiating our exploration.
2. Explored the subsurface soil conditions via 4 exploratory test pits (2 test pits at each site) extending 7.5 to 8.5 feet below the existing ground surface. We collected samples in each test pit at various depths. Exploration locations are shown on the attached Plates 1 & 2 – *Exploration Map*.
3. Performed laboratory testing on select soil samples obtained during exploration referencing *ASTM International* (ASTM) test standards.
4. Discussed project design and construction concepts with J-U-B, reviewed subsurface conditions, laboratory test results and proposed construction, conducted geotechnical analyses, and prepared geotechnical recommendations to assist project design and construction.
5. Provided this deliverable for J-U-B's use throughout design and construction.

GPI project and principal engineers will remain available to consult with the design team as necessary while project documents are developed and design is finalized.

PROJECT UNDERSTANDING

The Indian Hills booster pump station site is located on undeveloped farm land just north of Southview Avenue and 500 feet east of the Idaho Highway 95 intersection, on the south side of Moscow, Idaho. The property is bordered to the south by Southview Avenue, and north, east, and west by existing commercial or residential developments. The ground surface at the Indian Hills site maintains a slight slope, downwards to the southwest at approximately 8:1. The site surface is covered with various grasses and weeds. Photograph 1 below shows existing site conditions at the Indian Hills site.

Photograph 1. Indian Hills Booster Pump Station Site



The Ponderosa booster pump station site is located on the southeast corner of the Orchard Avenue and Lanny Lane intersection, and is bordered to the south and east by existing residential property. The Ponderosa site was previously levelled via earthwork accomplished along Lanny Lane in 2016; therefore, the site surface is relatively flat and is currently vegetated at the surface with various grasses and weeds. Conditions at the Ponderosa site are shown in Photograph 2 below.

Photograph 2. Ponderosa Booster Pump Station Site



At each site, the planned improvements will include constructing a new, single-story, masonry structure, supported on typical shallow spread footings, and slab-on-grade floors. Project structural design is not yet initiated. However, based on our experience with similar booster pump stations, we anticipate the buildings will have a footprint less than 1,000 square feet, and will apply loads less than 1,500 pounds per linear foot to continuous perimeter footings. Pumps and other equipment will be placed on the finished slab, and will not be embedded below grade in shafts or other excavations. From reviewing preliminary site plans provided by J-U-B, the Indian Hills pump station is anticipated to be founded in cuts ranging from 5 to 10 feet while the Ponderosa sight is anticipated to be founded on cuts less than 5 feet. We anticipate foundations at each site to be constructed entirely in cut. No below-grade construction is anticipated. The planned improvements may also include constructing asphalt-paved access drives and parking areas for City maintenance vehicles, and stormwater collection swales for disposal into existing City stormwater collection facilities.

FIELD EXPLORATION

GPI explored subsurface conditions at each site by observing 4 exploratory test pits advanced with a John Deere 60G extending to depths ranging from 7.5 to 8.5 feet below the existing ground surface. In explorations we obtained soil samples at select depths and locations. Test pits were loosely backfilled at the conclusion of exploration. Plates 1 & 2 illustrate approximate exploration locations at each site. Our Geotechnical Engineer visually described, classified, and logged the subsurface conditions encountered during exploration referencing the *Unified Soil Classification System (USCS)*. Appendix A – *USCS Exploration*

Logs presents exploration logs and a USCS explanation, which should be used to help interpret soil terms used throughout this report and on the exploration logs.

SUBSURFACE CONDITIONS

Topsoil containing vegetation and organics was encountered at the surface in each test pit and varied from 0.5- to 1.0-foot-thick in the locations explored. Beneath topsoil, we encountered the following subsurface units at the Indian Hills site:

Alluvium

- ☒ Silt (ML): Dark brown, very soft to soft, and moist to wet. Alluvial silt was identified in test pits TP-17274A-1 and -2 beneath the topsoil to depths ranging from 3.0 to 5.0 feet below the ground surface. This soil unit is historically known to be very soft and wet and generally is not suitable for a subgrade bearing unit.

Loess

- ☒ Clay (CL): Grayish brown, firm to stiff, moist. Clay loess was encountered beneath the alluvial silt layer in test pits TP-17274A-1 and -2 extending to termination depths.

The following subsurface units were encountered at the Ponderosa site:

Undocumented Fill

- ☒ Clay with Trace Gravel (CL): Grayish brown, soft to stiff, and moist to wet. Undocumented fill was encountered in test pits TP-17274A-3 and -4 beneath the topsoil layer extending to approximately 3.0 and 5.0 feet, respectively.

Alluvium

- ☒ Clay (CL): Grayish brown, stiff, and moist. Alluvial clay was encountered in test pits TP17274A-3 and -4 beneath the undocumented fill layer extending to termination depths.

Neither bedrock nor groundwater was encountered at the time of exploration at either site. Bedrock is not anticipated in the depths of construction (less than 10 feet). Groundwater may appear as seeps or springs and can be impacted by irrigation cycles, development in the area, precipitation, infiltration, and other factors.

LABORATORY TESTING

We tested select soil samples retained from each site during exploration to assess:

- | | |
|---|--------------------|
| ☒ Natural moisture content | ☒ Modified Proctor |
| ☒ Grain size distributions (No. 200 wash) | ☒ Atterberg limits |
| ☒ In-situ density | ☒ Consolidation |

We performed laboratory testing referencing applicable *ASTM* procedures. Index test results are summarized on the exploration logs. We used the laboratory test results to correlate to soil engineering design parameters relied on for analysis of various site components. Laboratory test results are provided in Appendix B – *Laboratory Test Results*.

GEOTECHNICAL OPINIONS AND RECOMMENDATIONS

The following geotechnical recommendations are presented to assist planning, design, and construction for the proposed booster pump stations at the Indian Hills and Ponderosa sites in Moscow, Idaho. Our recommendations are based on our exploratory test pits, field evaluation, laboratory testing, our experience with similar soil conditions and our understanding of the planned developments. If design plans change or if the subsurface conditions encountered during construction vary from those observed during our exploration, notify us to review our recommendations, make revisions if necessary, and to assist with earthwork construction.

Earthwork

Site Preparation

Topsoil containing vegetation and organics must be removed from the site or stockpiled for use as landscape fill. We recommend budgeting 1-foot of topsoil, vegetation, and organic removal. Isolated thicker topsoil zones should be expected across each site.

Test Pit Remediation

We recommend all test pits located beneath the planned improvements be remediated during earthwork construction. Excavations shall remove loose, disturbed soil and replace it with *General Structural Fill* meeting the requirements outlined herein.

Undocumented Fill

Undocumented fill was encountered at the Ponderosa site near the surface extending to depths up to 5.0 feet below the existing ground surface. We anticipate the undocumented fill originated as part of the earthwork activities performed while constructing Lanny Lane. Prior knowledge from the construction of the roadway and specific laboratory testing from exploration allowed us to estimate that the fill encountered during exploration exhibits structural fill properties. Densities gathered from field exploration correspond to greater than 90% of the maximum dry density of the material believed to have been placed and compacted during the roadway construction. Therefore, we conclude that the fill material is suitable for foundation subgrades, provided it maintains *Structural Fill* requirements outlined herein throughout construction.

Establishing Subgrades

Dark brown alluvial silt is common in natural drainages across the Palouse. This unit was identified to approximately 5.0 feet below the ground surface at the Indian Hills site and may require removal prior to foundation construction. Preliminary site plans indicate that cuts to achieve planned bearing elevations will remove the majority of the soft native soil below the Indian Hills station. However, thicker deposits may be encountered and require over-excavation. Remove soft soil and replace with *Granular Structural Fill* as outlined herein.

At both sites, following site stripping, test pit remediation, soft or unsuitable soil removal, and prior to placing structural fill, foundation, or hardscape; prepare subgrades to receive fill, concrete, asphalt, or other site improvements as outlined below:

☞ Building Foundation, Slab & Pavement Subgrades:

- Expose stiff, native soil exhibiting PP readings greater than 2.0 tsf or scarify and compact to 95% of the Modified Proctor. Where fill soil is encountered, scarify and compact to at least 95% of the Modified Proctor.

After preparing subgrades, it is the contractor's sole responsibility to protect subgrades from degradation, freezing, saturation, or other disturbance. Seasonal wet and freezing weather conditions saturate and soften the finished subgrades, requiring additional earthwork to recompact loosened surface soil to structural fill conditions. This re-work should be specified as incidental to J-U-B as part of the contractor's means and methods. Also note, rework at the surface that may have been exposed to wet or freezing weather can be laborious. There are numerous approaches that can be implemented to help protect prepared subgrades. GPI can assist with these at which time contractor staging becomes evident.

Our opinion is careful construction and earthwork procedures are critical to achieving adequate subgrade preparation and reducing over-excavation. Specifically, these procedures could include, but are not limited to, carefully staging equipment and/or stockpiles, routing construction equipment away from subgrades, and implementing aggressive site drainage procedures to help reduce saturating subgrades during wet weather conditions. GPI will remain available to consult with J-U-B, the City, and your contractors as the project moves forward regarding subgrade preparation procedures.

Excavation Characteristics

We anticipate site soil may be excavated using conventional excavation techniques. Based on our exploration results, we do not anticipate bedrock excavation will be required for site grading on this project. We do not expect the planned construction will encounter groundwater.

Plan excavations carefully, to be sloped, shored, or braced in accordance with the *Occupational Safety and Health Administration* (OSHA) regulations and local codes. Our exploration suggests the fine-grained native soil at each site is considered "T "Type C" soil when it remains dry and must be temporarily sloped back no steeper than 1.5H:1V (horizontal:vertical). Construction vibrations can cause excavations to slough or cave. We do not recommend materials be stockpiled adjacent excavations, which may cause a surcharge and contribute to excavation instability. Ultimately, the contractor is solely responsible for site safety and excavation configurations factoring in water infiltration, construction access, adjacent loading, and other factors that contribute to excavation stability.

Although the presence of water in excavations is unlikely with good surface water controls, contractors must plan excavations with water collection points and anticipate utilizing conventional sumps and pumps to remove nuisance water from runoff, seeps, springs, or precipitation. If site soil excavations are not immediately backfilled, they may degrade when exposed to runoff and require over-excavation and replacement with granular fill. We recommend construction activities and excavation backfilling be performed as rapidly as possible following excavation to reduce the potential for subgrades to degrade under inclement weather or construction traffic.

Wet Weather/Soil Construction

Once the subgrade elevation is achieved, it is the contractor's responsibility to protect the soil from degrading under construction traffic, freezing and/or wet weather. Initial footing excavations should not be completed within 24 hours of expected precipitation. Footing or slab concrete placement should never be attempted following a significant precipitation event and the subgrade should never be allowed to freeze prior to concrete or fill placement. The condition of the subgrade and careful construction procedures are critical to foundation and slab stability and the long-term performance of the planned improvements.

Initiating earthwork in the winter or spring (December through April) can negatively impact the project, and require substantial weather delays, over-excavations, and/or rework. However, earthwork can typically be

extended into late fall (October through November) with reduced risk of these moisture-related earthwork challenges.

Structural Fill

All fill for this project must be placed and compacted as structural fill. Site soil (excluding topsoil containing vegetation and organics) may be re-used as *General Structural Fill* for site grading provided it meets the requirements in this report. Various imported fill materials will also be required throughout construction. Our recommended material requirements for structural fill are provided, referencing the 2018 *Idaho Transportation Department (ITD) Standard Specifications for Highway Construction (Standards)*. Project structural fill products are described in Table 1: *Structural Fill Specifications and Allowable Use*.

Table 1. Structural Fill Specifications and Allowable Use

Soil Fill Product	Allowable Use	Material Specifications
General Structural Fill	- Site grading, general backfilling & stem wall backfill - Non-structural fill applications	- Soil classified as GM, GW, SM, SP, SW, SC, CL, or ML according to the USCS. - Site soil free of vegetation, organics, and debris meets these requirements. - Soil must contain less than 3 percent (by weight) of organics, vegetation, wood, metal, plastic, or other deleterious substances. - Maximum mean particle size must be less than 0.5-feet in diameter
Granular Structural Fill	- Backfilling over-excavations - General structural fill applications	- Soil meeting requirements stated in Section 703.11 Aggregate for Granular Subbase in the ITD Standards. - Soil may not contain particles larger than 0.3-feet in diameter. - Soil must contain less than 3 percent (by weight) of organics, vegetation, wood, metal, plastic, or other deleterious substances.
Crushed Aggregate	- Granular structural fill applications - Foundation, slab, & pavement support aggregate	Soil meeting requirements stated in Section 703.04 – Aggregate for Untreated Base, Treated Base and Road Mix, in the ITD Standards.
Unsatisfactory Soil	NONE	- Soil classified as MH, OH, CH, OL, or PT shall not be used at the project site. - Any soil containing more than 3 percent (by weight) of organics, vegetation, wood, metal, plastic, or other deleterious substances.

Site Soil Re-Use

On-site soil will likely require processing to meet the requirements in Table 1, which will likely include moisture conditioning. Earthwork contractors must understand and plan for the time required to process soil and compact it to meet the report requirements. Difficulty achieving required compaction may impact construction costs, schedules, and other project aspects. Allowing time and space (i.e., lay-down area) to process and segregate excavated site soil and facilitate proper moisture conditioning during dry weather is

critical if the contractor plans to re-use site soil as structural fill. Proper moisture conditioning or drying can help reduce excessive compaction efforts and the need to import granular fill.

Compaction

Place structural fill only over approved subgrades. Never place structural fill over frozen, saturated, or soft subgrades. Subgrades must be approved by the project geotechnical engineer retained for construction. Fill placed outside the building or pavement envelopes can be placed as non-structural fill (i.e., landscape fill) providing there are no structures (sidewalk, curbs, utilities, signs, etc.) Structural fill products must be moisture conditioned to near optimum moisture content and placed in maximum 1-foot-thick, loose lifts. This lift thickness requires compaction equipment with static weight of at least 5 tons. If smaller or lighter compaction equipment is used, reduce the lift thickness to meet the compaction requirements presented in Table 2.

Table 2. Required Compaction for Designated Project Areas

Project Area	Required Structural Fill Product	Compaction Requirement¹
Foundation, concrete, and asphalt bearing surfaces.	Native soil ² or structural fill	95%
General site grading, utility trench backfilling, stemwall backfill	General structural fill	95%
Pavement & slab support aggregate	Crushed surfacing	95%

1. Relative compaction requirement compared to the maximum dry density of the soil as determined by ASTM D1557 (Modified Proctor).
2. Stiff native soil exhibiting PP readings greater than 2.0 tsf.

Earthwork Observation and Testing

Successful earthwork activities are important to the project's long-term performance. Retaining experienced earthwork contractors is the first step in having confidence that earthwork will be performed in reference to this report's requirements. Providing the necessary testing and engineering verification of earthwork activities is the second step. The firm retained to verify design-specified subgrade conditions, unsuitable soil removal, soil bearing units, and compaction shall become the geotechnical engineer-of-record (GER) for construction. The criteria below outlines the minimum testing and observation frequencies to implement during earthwork and foundation construction.

1. Subgrades exposed prior to fill placement – Reviewed by GER retained for construction for conformance with this report's design criteria. PP readings greater than 2.0 tsf or one compaction test every 500 square feet (sf) or 3 tests per slab/pavement area, whichever results in the greater number of tests.
2. Mass Grading/Structural Fill Placement – One compaction test every 1,000 sf, per fill lift, minimum 3 tests per testing event.
3. Slab, Pavement, and Foundation Bearing Surfaces – Bearing surface conditions verified by an experienced engineer to confirm conditions as required by design. Additionally, and as applicable pending materials encountered, 1 compaction test every 100 linear feet (lf) of continuous foundations and 500 sf for slab/pavement areas, or a minimum of 3 tests per alignment/area.
4. Foundation Wall Backfill – One compaction test every 50 lf of wall or minimum 3 tests per wall line (interior and exterior), whichever results in the greater number of tests, per fill lift.

5. Utility Trench Backfill – One compaction test every 100 lf of trench and minimum 3 tests per utility alignment, whichever results in the greater number of tests, per each fill lift.
6. Asphalt Pavement Construction - One compaction test every 1,000 sf, minimum 3 tests per testing event. 1 laboratory test suite on a bulk sample of hot mix asphalt per each day's paving, including oil content, gradation and maximum theoretical (Rice) specific gravity.

Utility Trench Construction Considerations

Pipe bedding for utility construction should conform to ITD Standards *Section 703.04 - Aggregate for Untreated Base, Treated Base, and Road Mix* and Table 1 of this report. Loose soil must be removed from the base of utility trenches prior to placing pipe bedding. In addition, if water is encountered, it must be removed from the base of the utility trench before placing pipe bedding. We recommend utility pipes be placed on at least 0.5 feet of bedding placed over undisturbed native soil supported according to the pipe manufacturer's specifications and ITD requirements.

Thoroughly place and compact bedding below pipe haunches or the zone between the pipe invert and the spring line. Then place pipe bedding and compact it from the pipe invert to 1 foot above the top of the pipe with tamping bars and/or plate compactors to render the backfill to a firm and unyielding condition. To accomplish bedding compaction, the distance between the side of the pipe at the spring line and the trench wall should be at least 0.5 feet. Pipes shall always be placed at least 1 foot below any pavement or slab and according to local plumbing codes. The remainder of the utility trench should be backfilled in accordance with this report's *Compaction* section.

Geotextiles

Geotextile separation fabrics are required around drainage aggregate or foundation drain piping as outlined in the *Shallow Foundation Design* section and beneath asphalt pavement sections as a separation fabric. Also, depending on the time of year construction is initiated and the weather conditions at that time, fabric and geogrid may aid in constructability aspects of the project. The below specifications are provided simply to help guide material selection if deemed appropriate for construction. Where required, geotextiles shall meet the minimum requirements in ITD Standards Section 718.07, and the minimum properties shown in Table 3 below:

Table 3. Geotextile Specifications

Geotextile Type	Use	Minimum Material Specifications
Non-Woven Geotextile	- Foundation drains (required) - Asphalt pavement subgrade separation (required)	- Reference ITD Standards Section 718.07 Table 718.07-1 – Subgrade Separation Geotextile Criteria – Type III - Grab tensile strength: 270 pounds (ASTM D4632) - Puncture strength: 600 pounds (ASTM D6241) - Apparent opening size: US Sieve #70 or finer (ASTM D4751) - Permittivity: 0.7 seconds⁻¹ (ASTM D4491)
Triaxial or Biaxial Geogrid	Persistent soft subgrade conditions	93 percent junction efficiency (GRI-GG2-05) 3.0 kg-cm/degree Aperture Stability (U.S. Army Corp of Engineers Ref. 3.3.1.2000) - Minimum Radial Stiffness of 15,400 lb/ft at 0.5% Strain (ASTM D6637)

Apply geotextiles directly on approved subgrades, taut, free of wrinkles, and over-lapped at least 1-foot. Consult GPI to review geotextile applications or other subgrade improvement alternatives.

Shallow Foundation Design

Anticipated structural loads for the planned pump station buildings are assumed to be less than 3 kips per linear foot along continuous walls. In our opinion, the anticipated structural loads may be supported on typical shallow foundations that bear directly on stiff undisturbed native soil or compacted soil subgrades. The following criteria are provided to aid foundation structural design.

Design Criteria

Shallow foundation design shall incorporate the following criteria and the current International Building Code (IBC) edition adopted by local agencies:

1. Allowable bearing pressure: 2,500 pounds per square foot (psf). This requires:
 - a. Stiff, undisturbed native soil exhibiting $PP > 2.0$ tsf at the bearing elevation or;
 - b. Structural fill compacted to 95% per ASTM D 1557 and referencing the *Establishing Subgrades*, *Structural Fill*, and *Compaction* report sections.
 - c. Frost protection embedment depth: 2.5 feet below finished exterior surface.
 - d. Drained subgrade conditions via perimeter foundation drains. See *Site Drainage* report section.
 - e. Bearing pressure may be increased 30 percent under live loading conditions such as wind or seismic conditions.
2. Estimated vertical settlement due to new footing loads:
 - f. Total settlement: 1.0 inch
 - g. Differential settlement: 0.5 inches in 30-foot, horizontal span
3. Lateral load resistance:
 - h. Foundation base friction coefficient:
 - i. 0.35 for foundations cast on fine-grained soils
 - ii. Reduce friction by 2/3 for precast elements
 - i. Lateral passive resistance is available on foundation sides equal to 300 pounds per cubic foot (pcf) equivalent fluid weight (EFW) where site soil is used as backfill.
 - i. $\frac{3}{4}$ inches of lateral movement is required to mobilize full passive pressure.

Seismicity

GPI utilized site soil and geologic data, the project location, the *American Society of Civil Engineers (ASCE) Standard 7-16- Minimum Design Loads for Buildings and Other Structures* to establish a Seismic Site Class "D" at the project site. We recommend seismic design reference the parameters provided in Table 4, based on the soil conditions and project location. The risk-targeted maximum considered earthquake (MCE_R) spectral response acceleration parameters provided in Table 4 have been modified from a Site Class B to a Site Class D (standard acceleration coefficients for Site Class B multiplied by the Site Class Factors for Site Class D). The design spectral acceleration parameters provided in Table 4 are equal to 67 percent of the Risk Targeted MCE_R acceleration parameters.

Table 4. Seismic Response Criteria (ASCE 7-16)¹

Period (seconds)	Standard Acceleration Coefficients for Site Class B (g)	Site Factor for Site Class D	MCE _R Spectral Acceleration Parameters for Site Class D (g) ⁴	Design Spectral Acceleration Parameters for Site Class D (g)
0.0 (Peak)	PGA = 0.131 ²	F _{PGA} = 1.538	PGA _M = 0.202 (PGA * F _{PGA})	-
0.2 (Short)	S _S = 0.293 ³	F _a = 1.565	S _{MS} = 0.459 (F _a * S _S)	S _{DS} = 0.306 (⅔ S _{MS})
1.0	S ₁ = 0.106 ³	F _v = 2.388	S _{M1} = 0.253 (F _v * S ₁)	S _{D1} = 0.169 (⅔ S _{M1})

1. Values for location Latitude 46.747265° and Longitude -116.984855°.
2. Acceleration based on 2% probability of exceedance in 50 years.
3. Coefficients based on 1% probability of exceedance in 50 years.
4. Values for an ASCE Risk Category I/II/III

Concrete Slab-On-Grade Floors

We recommend new concrete slab-on-grade floors be supported by a minimum of 0.7-feet of *Crushed Surfacing Aggregate* meeting the requirements shown in Table 1. This assumes compacted *General Structural Fill* and native soil subgrades will be prepared beneath slabs per the *Earthwork* report section. Slabs must be structurally designed for the anticipated use and equipment or storage loading conditions. Based on correlations to our field and laboratory test results, if our recommendations are followed, we recommend concrete slab design utilize an allowable modulus of subgrade reaction (k) of 150 pounds per cubic inch (pci). To realize the estimated subgrade modulus, drained conditions, and a minimum of 0.7-feet of *Crushed Surfacing Aggregate* must be provided over the compacted subgrade soil.

Asphalt Pavement Section Design

The following pavement section design recommendations are provided referencing the *American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures* (1993). We understand pavements surrounding each booster station will be subject to only “light duty” use via typical passenger vehicles and maintenance pick-up trucks. We recommend vehicles greater than 40,000 lb gross vehicle weight (GVW) be prohibited. GPI assumed traffic loading and design parameters based on typical flexible pavement design criteria in the Northern Idaho area, results from laboratory testing, and the subsurface conditions. The following tables present the preliminary design parameters and references, as well as resulting flexible pavement section design recommendations.

Table 5. Pavement Design Parameters

Design Parameter	Value Used	References
Reliability (R)	85%	Assumed
Standard Deviation (S)	0.45	AASHTO 1993
Initial Serviceability (PSI _i)	4.2	Typical Northern Idaho area values
Terminal Serviceability (PSI _t)	2.2	Typical Northern Idaho area values
Traffic Loading	7,000 ESALS ¹	Estimated Traffic Loading: • 40,000-lb GVW (service truck, 2 axles) -2 cycles per week • 6,000-lb GVW (City maintenance vehicles, 2 axles) -10 cycles per week
Design Life	20 years	Typical Northern Idaho area value
Resilient Modulus (Mr)	5,000 psi ²	Based on Mr correlations to soil type
Asphalt Layer Coefficient (a ₁)	0.42	Figure 2.5 AASHTO 1993
Top Course Layer Coefficient (a ₂)	0.12	Figure 2.6 AASHTO 1993
Top Course Drainage Coefficient (m ₂)	1.0	Table 2.4 AASHTO 1993 for “fair” drainage, 5 percent saturation

1. Equivalent Single Axle Loads (ESALs)
2. Pounds per square inch (psi)

The above traffic loads for the pavement section are based on an anticipated 5 percent growth factor over a 20-year pavement design life. Note the pavement design assumes no construction traffic. Significant pavement damage can occur after just a single pass with heavily loaded construction equipment.

Based on correlations to laboratory testing, soil type, and experience with the site subgrade soil in the area, the subgrade soil is estimated to have a resilient modulus of 5,000 psi, provided the subgrade is compacted as recommended in the *Earthwork* report section. Based on the above pavement design parameters, Table 6 provides the flexible pavement design section recommendations.

Table 6. Flexible Pavement Design

Pavement Section Material	Recommended Thickness (feet)	Material Specifications
Asphalt Concrete	0.21	Hot-mix asphalt (HMA) conforming to <i>Section 405</i> , latest ITD Standards edition. HMA should consist of ½ -inch to ¾ -inch-minus nominal aggregate size.
Crushed Surfacing	0.50	Must conform to <i>Crushed Aggregate</i> in the <i>Structural Fill</i> section requirements.
Non-Woven Geotextile Fabric	Required	<i>ITD Standards Section 718.07</i> , and the minimum properties shown in <i>Table 3</i> in this report.

Pavement Maintenance

Crack maintenance should be accomplished on all pavement surfaces every 3 to 5 years to reduce the potential for surface water infiltration into the underlying pavement subgrade. Surface and subgrade

drainage are extremely important to the performance of the pavement section. Therefore, the subgrade, crushed surfacing, and paved surfaces should slope at no less than 2 percent to an appropriate stormwater disposal system or other location established by J-U-B that does not impact existing or adjacent buildings or properties.

Pavement performance will depend upon achieving adequate drainage throughout the section and especially at the subgrade. Water ponding or saturating the pavement subgrade surface can induce heaving during the freeze-thaw process, which can readily damage pavement. The City should annually review pavement surface performance to help identify and address any pavement maintenance issues. Slurry seal applications are a common maintenance procedure. If desired for pavement maintenance or preservation, we provide recommendations for slurry seal applications in the following items.

1. Cleaning: ensure that cracks are thoroughly clean, dry, and free of all loose and foreign material when filling with crack sealant material. Use a hot compressed air lance to dry and warm the pavement surfaces within the crack immediately prior to filling a crack with the sealant material. Do not overheat pavement. Flame dryers are not allowed.
2. Sand Slurry: for cracks greater than 1 inch in width, fill with sand slurry by thoroughly mixing the components and pour the mixture into the cracks until full. Add additional CSS-1 cationic emulsified asphalt to the sand slurry as needed for workability to ensure the mixture will completely fill the cracks. Strike off the sand slurry, flush with the existing pavement surface, and allow the mixture to cure.
3. Hot Poured Sealant: for cracks less than 1 inch in width, fill with hot poured sealant by applying the material in accordance with these requirements and the manufacturer's recommendations. Confine hot poured sealant material within the crack. Clean any overflow sealant from the pavement surface.

Site Drainage Considerations

Runoff from precipitation or snowmelt must be routed away from structures to the maximum extent practical and must not be allowed to infiltrate beneath or be diverted towards foundations, exterior flatwork, or slab subgrades. Runoff or water migrating along the ground surface must be conveyed away from planned improvements by an appropriately designed series of catch basins, ditches, swales, or other surface water management procedures.

We recommend the ground surface outside all structures be sloped at least 5 percent away for a minimum of 10 feet to rapidly convey surface water or roof runoff away from foundations. Site grades beyond 10 feet from structures should slope at least 2 percent away and toward acceptable areas. *Americans with Disabilities Act* (ADA) hardscapes may not meet the above site grading recommendations adjacent to structures. We recommend ADA-pertinent hardscapes be sloped away from structures to the maximum extent practical. We recommend elastomeric sealant be considered between exterior hardscapes and foundation stemwalls to reduce moisture infiltration at joints at the building. Well-designed site drainage and careful final grading will help limit moisture infiltration beneath the structures, which will help reduce impacts from frost heave, vapor intrusion to interior spaces, and help improve long-term performance of structures. Provide roof gutters and downspouts, however never connect them to the foundation drains.

Perimeter Foundation Drainage

Install subsurface drains in perimeter foundation alignments as shown on Plate 3 - *Foundation Drain Schematic*. Maintaining uniformly drained conditions at the foundation subgrade is critical to long-term building performance and to help route water away from footings to reduce settlement risk. We recommend

installing foundation drains at the lowest bearing elevation around each structure's perimeter. We anticipate geotextile fabric-wrapped foundation drains will be placed atop the prepared subgrade surface before foundation backfilling. Foundation drains should never connect to roof drains and should daylight to a disposal area at least 50-horizontal-feet away, and down-gradient of the planned foundation bearing elevation.

ADDITIONAL RECOMMENDED SERVICES

Geotechnical Design Continuity

The information contained in this report is based on preliminary structural loads and site configurations. The final floor elevation, building configuration, loading conditions, drainage provisions and site geometry can significantly alter our opinions and design recommendations. Changes in structural design loads site grading and drainage design may require additional analyses specific to the actual anticipated construction conditions. Therefore, it is critical GPI provide geotechnical continuity through final planning and design for the planned construction as individual aspects become available during design development phases of the project.

Our experience is that having consultants from the design team review the construction documents prior to bidding helps reduce the potential for errors, and also reduces costly changes to the contract during construction. If we are not provided such opportunities, we cannot be responsible for soil-related design or construction-related errors, omissions, delays, or increased costs that are identified during construction.

Geotechnical Observation During Construction

We recommend GPI be retained by J-U-B or the City of Moscow to provide construction monitoring to confirm the soil conditions and document report recommendations are incorporated into the actual construction. Such observation is an important part of the geotechnical design process and can help reduce the potential for soil engineering- or construction-related errors or omissions. For this project it is especially important to maintain this geotechnical continuity during the subgrading process. If we are not retained to provide the recommended construction monitoring services, we cannot be responsible for soil engineering-related construction errors or omissions.

EVALUATION LIMITATIONS

This report is prepared to assist project planning design and construction of the Proposed Booster Pump Stations – Phase II project in Moscow, Idaho. Our geotechnical findings and opinions are developed based on the authorized subsurface exploration and laboratory testing, as well as our understanding of the project at this time. Our geotechnical design recommendations are specific to the planned booster pump station sites outlined herein and should not be extrapolated to other future site developments without allowing adequate geotechnical consultation by GPI. Our services on this project do not include civil or structural design, deep or intermediate foundations, subsurface dewatering, shoring or earth retention system design or designing erosion control measures.

Our services consist of professional opinions and findings made in accordance with generally accepted geotechnical engineering principles and practices in northern Idaho at the time of this report. The geotechnical recommendations provided herein are based on the premise that appropriate geotechnical consultation during subsequent design phases is implemented and an adequate program of tests and observations will be conducted by GPI or another experienced geotechnical engineer during construction to verify compliance with our recommendations and to confirm conditions between exploration locations. This acknowledgment is in lieu of all warranties either express or implied.

The following plates accompany this report.

Plates 1 & 2: Exploration Maps
Plate 3: Foundation Drain Schematic
Appendix A: Unified Soil Classification System (USCS) and Exploration Logs
Appendix B: Laboratory Test Results

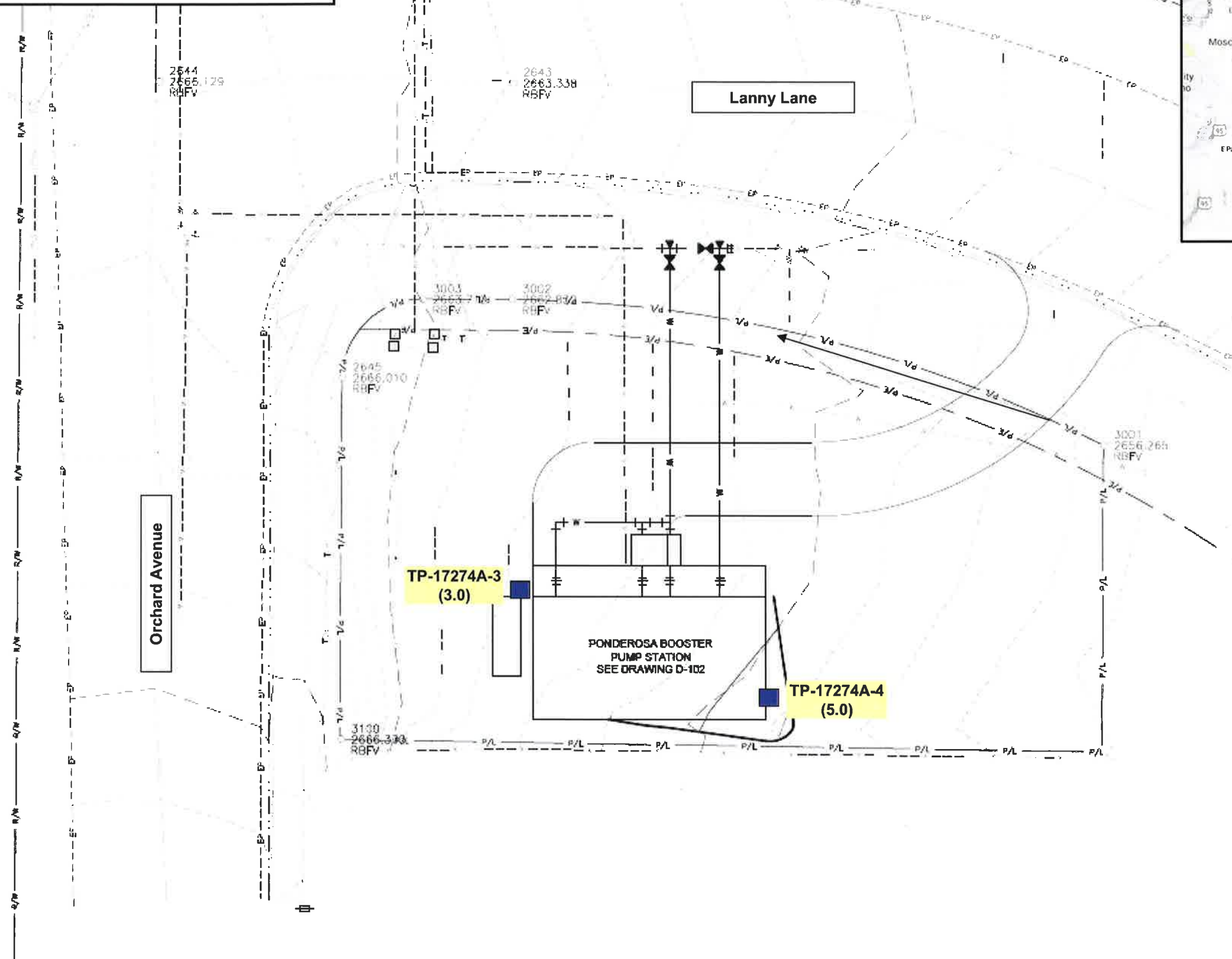
LEGEND

TP-17274A-1

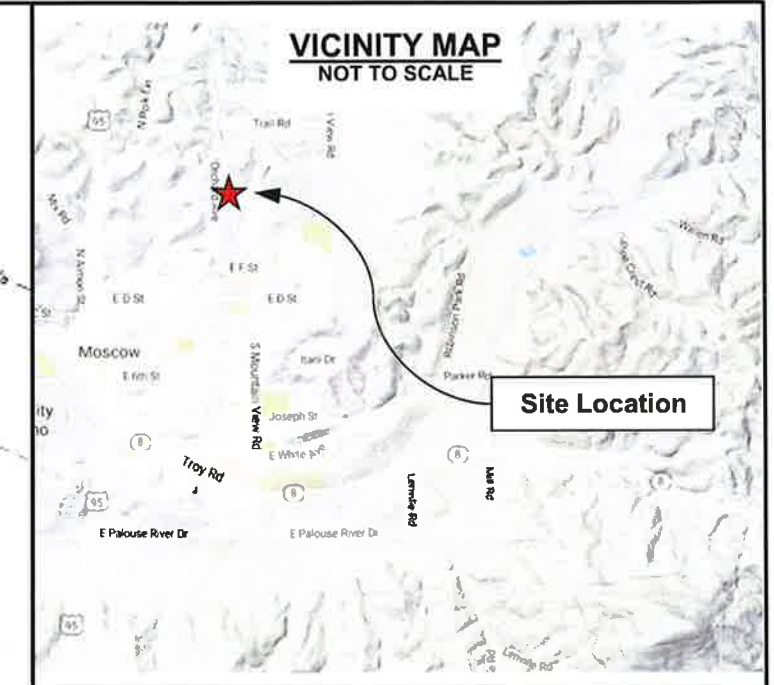
Approximate test pit location observed by GPI on March 19, 2020.

(1.0)

Approximate depth of fill observed (feet).



VICINITY MAP
NOT TO SCALE



EXPLORATION MAP

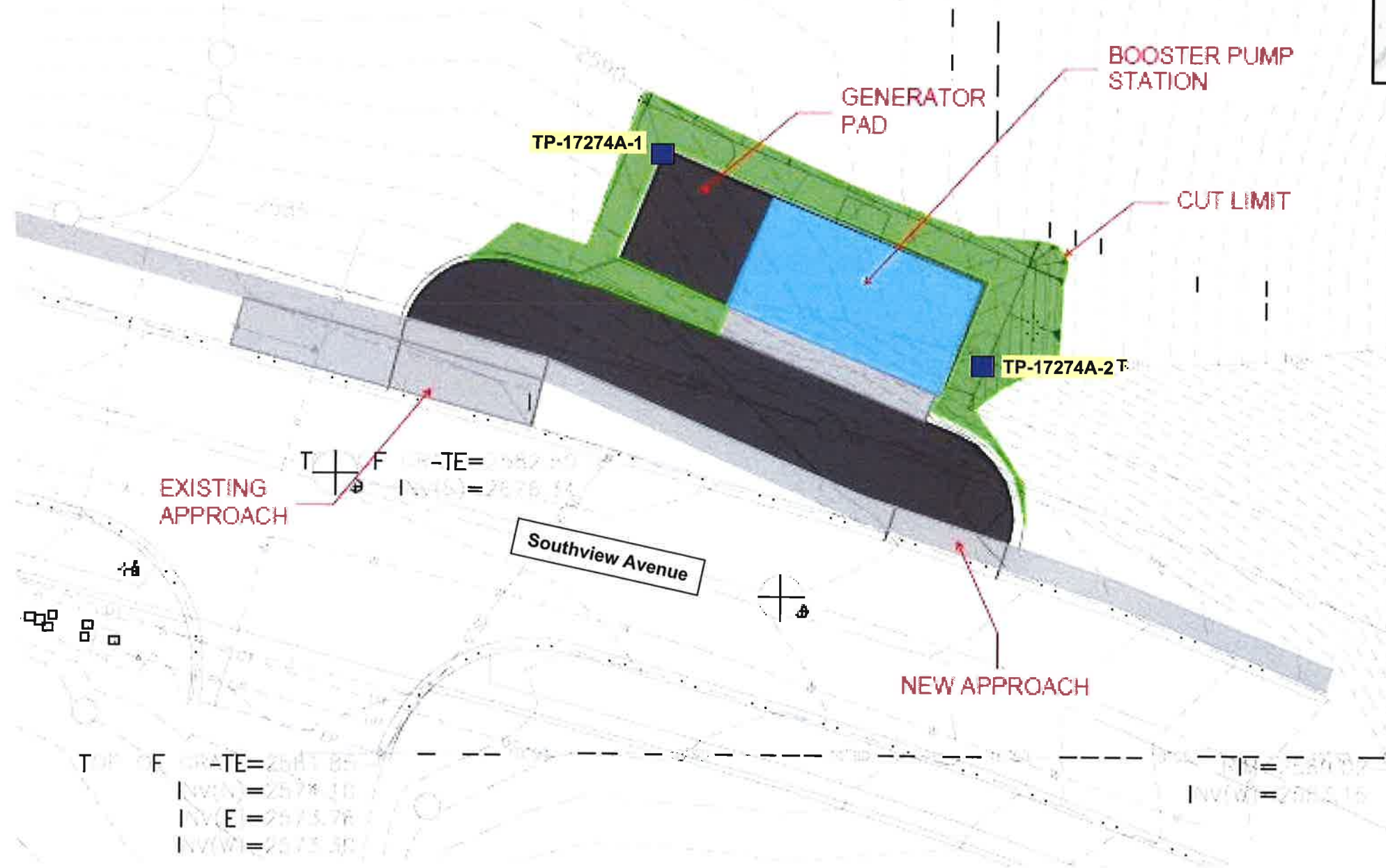
**Moscow Booster Pump Stations
Ponderosa Site
Orchard Avenue
Moscow, Idaho**



MO17274A

PLATE 1

Approximate test pit location observed by GPI on March 19, 2020.



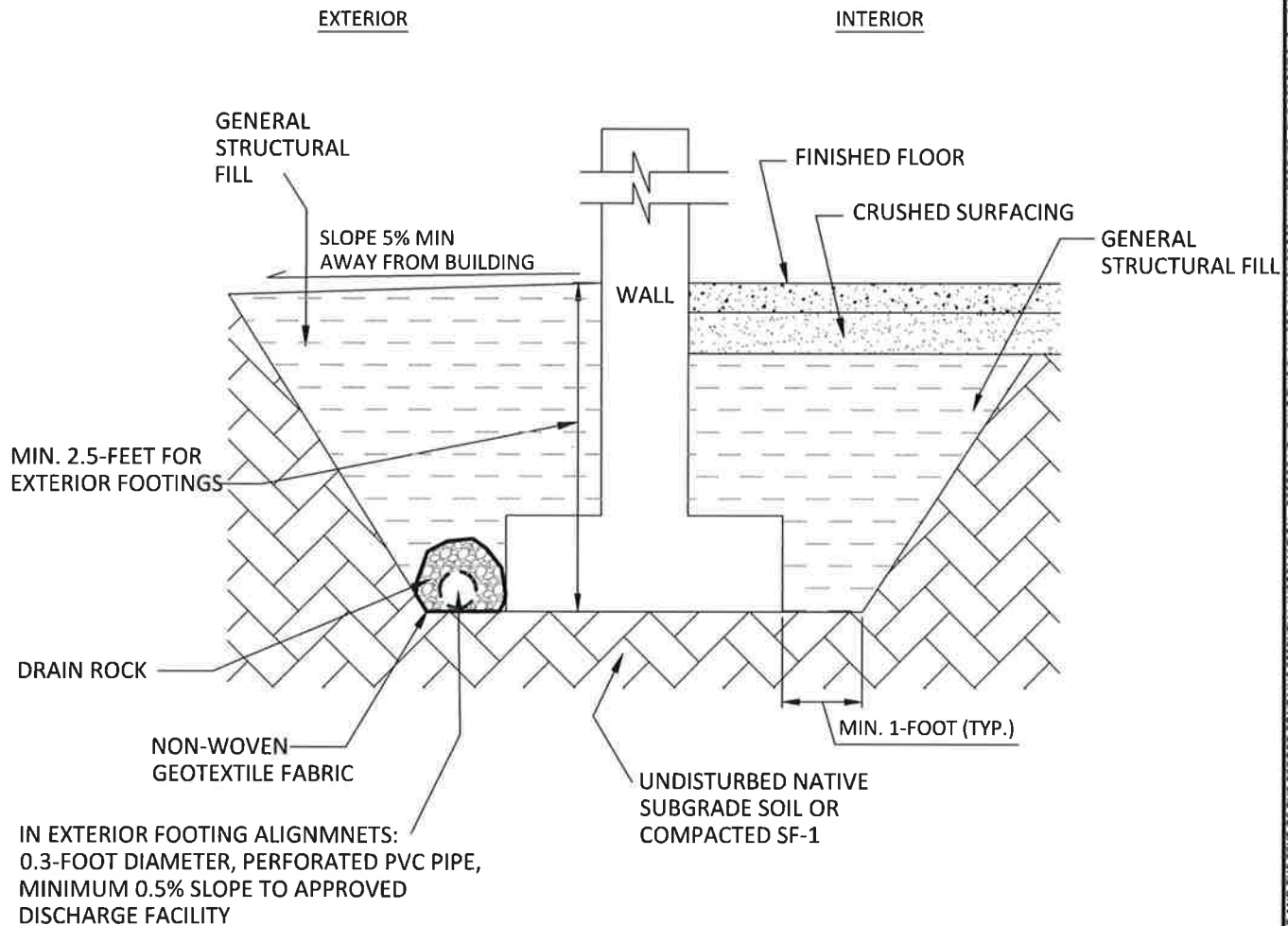
**GeoProfessional
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PLATE 2

Foundation Drain Construction

- Excavate the subgrade to the planned foundation bearing elevation to expose undisturbed native soil or previously placed fill.
- Prepare the exposed subgrade referencing the *Subgrading* report requirements. Geotechnical engineer to verify subgrades.
- In exterior (perimeter) foundation alignments, place 0.3-foot diameter, perforated PVC or ADS pipe at lowest possible elevation to maintain gravity drainage, with positive slope towards daylight or approved discharge facility. Cover pipe with drain rock and wrap with geotextile fabric.
- Backfill over-excavations with *Granular Structural Fill*, placed and compacted referencing the *Structural Fill* report section.

This drawing is intended for shallow foundations supporting isolated columns or walls. Foundation stemwall height will vary. This is not a structural detail.



FOUNDATION DRAIN SCHEMATIC

Proposed Moscow Booster Stations Phase II

Moscow, Idaho

NOT TO SCALE



MO17274A

PLATE: 3

DRAWN BY: JBM

CHECKED BY: AJA

THIS FIGURE COMPROMISES A PORTION OF GPT'S REPORT AND THE TEXT OF THE REPORT CONTAINS ESSENTIAL INFORMATION. BEFORE UTILIZING THIS PLAN FOR ANY PURPOSE WHATSOEVER, THE REPORT SHOULD BE READ COMPLETELY. THIS FIGURE IS INTENDED TO HELP VISUALIZE THE INFORMATION PROVIDED BY OTHERS AND NO CHECK OF ACCURACY, CURRENCY, APPROPRIATENESS, ETC., OF INFORMATION PROVIDED BY OTHERS WAS PERFORMED, SINCE SUCH CHECKS WERE NOT PART OF GPT'S SCOPE OF SERVICES.

APPENDIX A

Unified Soil Classification System (USCS)

Exploration Logs

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GRAPHIC SYMBOL	GROUP SYMBOL	TYPICAL NAMES
COARSE GRAINED SOIL	GRAVEL	CLEAN GRAVEL		GW	WELL-GRADED GRAVEL, GRAVEL-SAND MIXTURES.
		GRAVEL WITH FINES		GP	POORLY-GRADED GRAVEL, GRAVEL-SAND MIXTURES.
				GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES.
	SAND			GC	CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURES.
		CLEAN SAND		SW	WELL-GRADED SAND, GRAVELLY SAND.
				SP	POORLY-GRADED SAND, GRAVELLY SAND.
				SM	SILTY SAND, SAND-SILT MIXTURES.
		SAND WITH FINES		SC	CLAYEY SAND, SAND-CLAY MIXTURES.
FINE GRAINED SOIL	SILT AND CLAY LIQUID LIMIT LESS THAN 50%			ML	INORGANIC SILT, SANDY OR CLAYEY SILT.
				CL	INORGANIC CLAY OF LOW TO MEDIUM PLASTICITY, SANDY OR SILTY CLAY.
				CL-ML	INORGANIC MIXED CLAY AND SILT.
				OL	ORGANIC SILT AND CLAY OF LOW PLASTICITY.
	SILT AND CLAY LIQUID LIMIT GREATER THAN 50%			MH	INORGANIC SILT, MICA-CEOUS SILT, PLASTIC SILT.
				CH	INORGANIC CLAY OF HIGH PLASTICITY, FAT CLAY.
				OH	ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY.
				PT	PEAT, MUCK AND OTHER HIGHLY ORGANIC SOILS.

BORING LOG SYMBOLS

STANDARD 2 INCH OD
SPLIT SPOON SAMPLE



CALIFORNIA MODIFIED 3 INCH
OD SPLIT SPOON SAMPLE



ROCK CORE



SHELBY TUBE 3 INCH OD
UNDISTURBED SAMPLE



TEST PIT LOG SYMBOLS

GRAB BAG SAMPLE

BG

BULK SAMPLE

BK

RING SAMPLE

RG

GROUNDWATER SYMBOLS

GROUNDWATER AFTER 24
HOURS



GROUNDWATER AT TIME OF
EXPLORATION



GROUNDWATER AT THE END OF
EXPLORATION



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USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits	Remarks
									LL PI	Note: BGS = Below Ground Surface
<u>TOPSOIL</u> - SILT, (ML) brown, soft, moist	0.0	ML								Moderate vegetation and organics encountered to approximately 1.0-foot BGS.
<u>ALLUVIUM</u> - SILT, (ML) dark brown, very soft to soft, moist to wet	2.5	ML								
<u>LOESS</u> - CLAY, (CL) grayish brown, firm to stiff, moist	5.0	CL		RG						
Test Pit Terminated at 8.0 Feet. Test pit loosely backfilled with site soil.										
Client: J-U-B Engineers, Inc.		Test Pit Number: TP-17274A-1				EXPLORATORY TEST PIT LOG				
Project: MO17274A		Date Excavated: 03-19-2020								
Backhoe: John Deere 60G		Bucket Width: 1.5'								
Depth to Groundwater: N.E.		Logged By: JBM				Sheet 1 Of 1				

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits	Remarks
									LL PI	Note: BGS = Below Ground Surface
<u>TOPSOIL</u> - SILT, (ML) brown, soft, moist	0.0	ML								Moderate vegetation and organics encountered to approximately 1.0-foot BGS.
<u>ALLUVIUM</u> - SILT, (ML) dark brown, soft, moist to wet	2.5	ML								
<u>LOESS</u> - CLAY, (CL) grayish brown, stiff to very stiff, moist	5.0	CL		BK						
	7.5			BG						
Test Pit Terminated at 8.5 Feet.										Test pit loosely backfilled with site soil.
Client: J-U-B Engineers, Inc.		Test Pit Number: TP-17274A-2			 GeoProfessional Innovation.		EXPLORATORY TEST PIT LOG			
Project: MO17274A		Date Excavated: 03-19-2020								
Backhoe: John Deere 60G		Bucket Width: 1.5'								
Depth to Groundwater: N.E.		Logged By: JBM								
										Sheet 1 Of 1

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits	Remarks
									LL PI	Note: BGS = Below Ground Surface
TOPSOIL - SILT, (ML) brown, soft, moist	0.0	ML								Trace vegetation and organics encountered to approximately 0.5-feet BGS.
UNDOCUMENTED FILL - CLAY WITH TRACE GRAVEL, (CL) grayish brown, soft to firm, moist to wet		CL		BK						
ALLUVIUM - CLAY, (CL) grayish brown, stiff, moist		CL								
Test Pit Terminated at 7.5 Feet. Test pit loosely backfilled with site soil.										
Client: J-U-B Engineers, Inc.		Test Pit Number: TP-17274A-3					EXPLORATORY TEST PIT LOG			
Project: MO17274A		Date Excavated: 03-19-2020								
Backhoe: John Deere 60G		Bucket Width: 1.5'								
Depth to Groundwater: N.E.		Logged By: JBM								
										Sheet 1 Of 1

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (ML) brown, soft, moist	0.0	ML								Trace vegetation and organics encountered to approximately 0.5-feet BGS.
UNDOCUMENTED FILL - CLAY WITH TRACE GRAVEL, (CL) grayish brown, firm to stiff, moist to wet	2.5	CL								
	5.0	CL								
ALLUVIUM - CLAY, (CL) grayish brown, stiff, moist	7.5	CL								
Test Pit Terminated at 8.0 Feet. Test pit loosely backfilled with site soil.										
Client: J-U-B Engineers, Inc.		Test Pit Number: TP-17274A-4						EXPLORATORY TEST PIT LOG Sheet 1 Of 1		
Project: MO17274A		Date Excavated: 03-19-2020								
Backhoe: John Deere 60G		Bucket Width: 1.5'								
Depth to Groundwater: N.E.		Logged By: JBM								

APPENDIX B

Laboratory Test Results



Report Date: 4/10/2020

Project No.: MO17274A
Project Name: Proposed Moscow Booster Stations Phase II
Client: J-U-B Engineers, Inc.

Test Results Summary														
Test Pit	Depth (feet)	Lab Number	Description (U.S.C.S. Classification)	In situ Moisture, %	In situ Dry Density, pcf	Max Dry Density, pcf	Optimum		Atterberg Limits		#200 Sieve Passing, %	pH	Resistivity Ω·cm	Sulfates ppm
							Moisture, %	Moisture, pcf	Liquid Limit	Plasticity Index				
TP-17274A-1	5.5-6.0	PUL20-0037A	Clay (CL)	21.6	-	-	-	-	-	-	93	-	-	-
TP-17274A-2	3.5-4.5	PUL20-0037B	Clay (CL)	-	-	117.5	12.0	-	-	-	-	TBD	TBD	TBD
TP-17274A-4	4.0-4.5	PUL20-0037C	Clay (CL)	28.6	94.8	-	-	-	TBD	TBD	96	-	-	-

BD = To Be Determined

TBD = To Be Determined

Reviewed by: _____

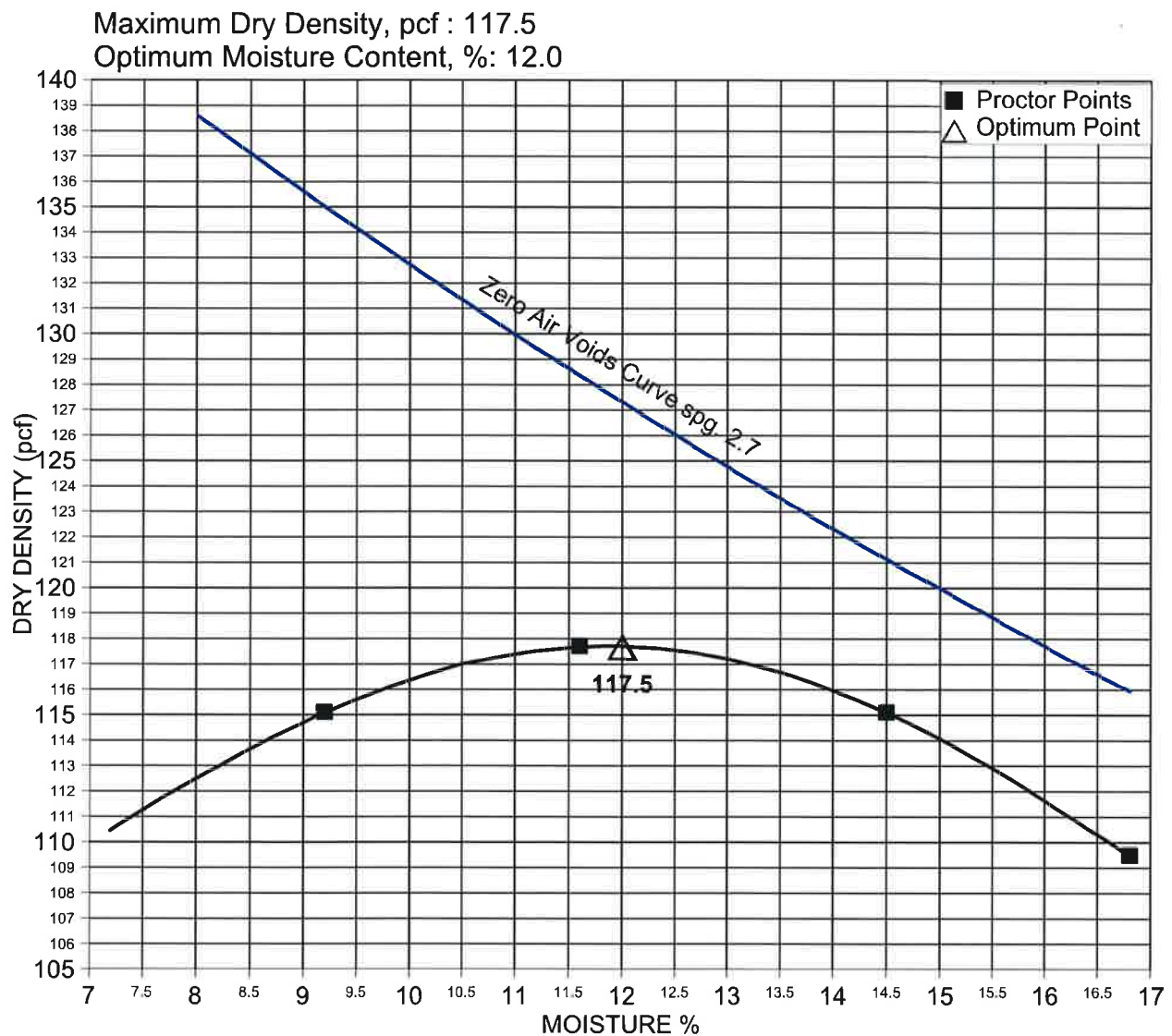
MOISTURE-DENSITY RELATIONSHIP CURVE

ASTM D 1557

Method A

GRADING ANALYSIS		
SCREEN SIZE	% PASSING	AS TESTED
No. 4	100	100

Project: Proposed Moscow Booster Stations Phase II
Client: J-U-B Engineers, Inc.
File Name: MO17274A
Lab Number: PUL20-0037B
Sample Location: TP-17274A-2 @ 3.5 - 4.5 feet BGS
Sample Classification: Clay (CL)
Date Tested: 3/25/2020 By: JNP
Rammer Type: Manual



Reviewed By: 



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City of Moscow

Latah County, Idaho



Booster Station Replacement – Phase II Rebid

REBID SET

AUGUST 2022

VOLUME III OF III
PLANS

ENGINEER:

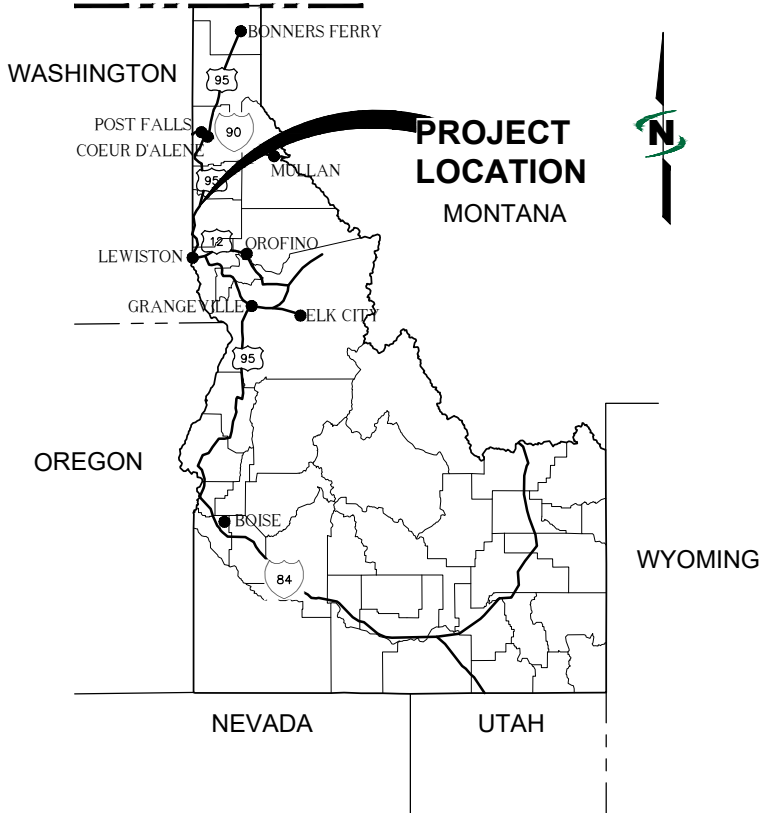


J-U-B ENGINEERS, Inc

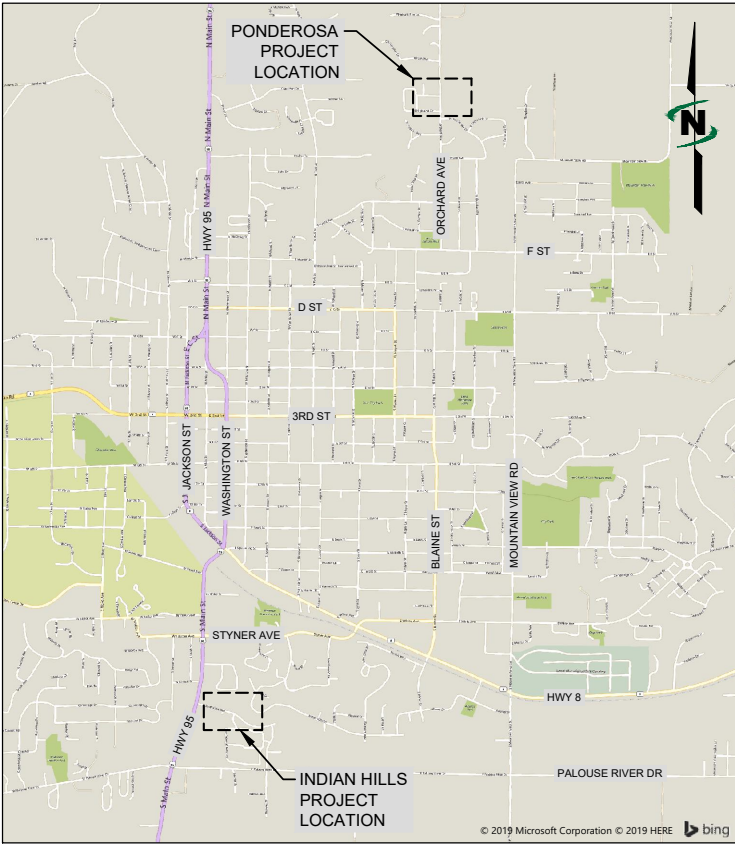
201 S. Jackson St.
Moscow, Idaho 83843
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Plot Date: 8/10/2022 \\CDAFILES\PUBLIC\PROJECTS\JUB21-18-022- MOSCOW BOOSTER STATION PROJECT\21-18-022-100_G-001X.DWG



AREA MAP



VICINITY MAP

CITY OF MOSCOW BOOSTER STATION REPLACEMENTS - PHASE II REBID

REBID SET
AUGUST 2022



PROJECT NO. 118-016



Know what's below.
Call before you dig.

CALL 2 BUSINESS DAYS IN ADVANCE BEFORE
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MARKING OF UNDERGROUND MEMBER
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WWW.B2-ARCHITECTURE.COM

ORIGINAL SIGNED
BY: MICHELLE L. JOHNSON
13810
DATE ORIGINAL
SIGNED: 08/12/2022



J-U-B ENGINEERS, INC.

201 South Jackson Street, Moscow, ID 83843

p | 208 746 9010 w | www.jub.com

PROJECT NO. 21-18-022

UTILITY CONTACT INFORMATION		
UTILITY	COMPANY	PHONE NUMBER
UTILITY LINE LOCATES	ONE-CALL	811
ELECTRIC	AVISTA	(509) 336-6240
WATER	MOSCOW WATER DEPARTMENT	(208) 882-3122
WASTEWATER	MOSCOW WASTEWATER DEPARTMENT	(208) 882-2725
CABLE & TELEPHONE	SPECTRUM	(866) 874-2389

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SHEET INDEX	
SHEET #	TITLE
GENERAL	
G-001	COVER SHEET
G-002	GENERAL PROJECT INFORMATION
G-003	PIPING AND HVAC SCHEDULES
G-004	LINE LEGEND, SHEET DESIGNATORS
G-005	SYMBOLS AND ABBREVIATIONS
CIVIL	
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C-102	INDIAN HILLS BOOSTER PUMP STATION
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LI-101	PONDEROSA IRRIGATION PLAN
LI-501	IRRIGATION DETAILS
LI-502	IRRIGATION DETAILS
LP-001	PLANTING NOTES
LP-002	PLANTING SCHEDULE
LP-101	PONDEROSA PLANTING PLAN AND DETAILS
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S1-202	INDIAN HILLS BOOSTER PUMP STATION
S1-301	INDIAN HILLS BOOSTER PUMP STATION
S1-302	INDIAN HILLS BOOSTER PUMP STATION
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S2-201	PONDEROSA BOOSTER PUMP STATION
S2-301	PONDEROSA BOOSTER PUMP STATION
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S-901	BOTH PUMP STATIONS
S-902	BOTH PUMP STATIONS
S-903	BOTH PUMP STATIONS
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A2-201	PONDEROSA - NORTH & EAST EXTERIOR ELEVATIONS
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CD-502	STANDARD DETAILS
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CD-505	STANDARD DETAILS
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CD-508	STANDARD DETAILS
ELECTRICAL (E)	
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E-052	PONDEROSA ELECTRICAL SCHEDULES
E-100	INDIAN HILLS ELECTRICAL SITE PLAN
E-150	PONDEROSA ELECTRICAL SITE PLAN
E-200	INDIAN HILLS POWER AND CONTROL PLAN
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E-202	INDIAN HILLS HVAC PLAN
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E-252	PONDEROSA LIGHTING AND RECEPTACLE PLAN
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E-254	PONDEROSA HVAC PLAN
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E-300	INDIAN HILLS ELECTRICAL ELEVATIONS
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E-701	INDIAN HILLS CONTROL PANEL LAYOUT
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E-704	INDIAN HILLS PANEL LAYOUT
E-705	INDIAN HILLS CONTROL PANEL SCHEMATIC
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E-753	PONDEROSA PANEL LAYOUT
E-754	PONDEROSA PANEL LAYOUT
E-755	PONDEROSA CONTROL PANEL SCHEMATIC
E-756	PONDEROSA CONTROL PANEL SCHEMATIC
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E-762	PONDEROSA WIRING DIAGRAMS
E-900	INDIAN HILLS ELECTRICAL DETAILS
E-901	PONDEROSA ELECTRICAL DETAILS

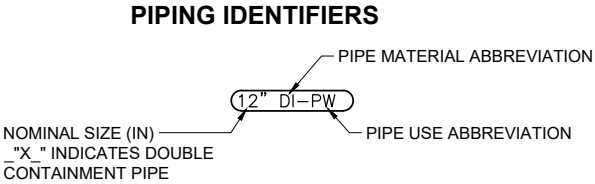
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Date Created: 8/4/2022 NCATFILES\PUBLIC\PROJECTS\JUB\21-18-022 - MOSCOW BOOSTER STATION PROJECT\21-18-022-100_G-001X.DWG

PROCESS PIPE SCHEDULE													
LEGEND	SERVICE	SIZE	INSIDE/ EXPOSED	BURIED	PIPE MATERIAL	LINING, PIPE	PIPE JOINTS	FITTING JOINTS	LINING, FITTINGS	MAX. OPERATING PRESSURE (PSI)	TEST PRESSURE (PSI) & TYPE OR SPECIFICATION	REMARKS	PIPE SOLID COLOR
ABDN	ABANDONED											NOTED FOR EXISTING ABANDONED PIPES	N/A
DR	DRAIN	<4"	X		PVC	NONE	S	S	NONE	GRAVITY	PER UPC	PRESSURE PIPE IS REQUIRED IF LINE WILL BE PRESSURIZED OVER 5 PSI	LIGHT GRAY
DR	DRAIN	≥4"		X	PVC	NONE	P	P	NONE	10	25, H		N/A
DR	DRAIN	≥ 4"		X	DI	E	P, M, F	M, F	E	10	25, H		N/A
PW (1, 2, ETC.)	POTABLE WATER	≤2"	X		CU					150	PER UPC	SEE PLUMBING/ MECHANICAL CODE AND POTABLE WATER REQUIREMENTS	DARK BLUE
PW (1, 2, ETC.)	POTABLE WATER	≤2"	X		CPVC					150	PER UPC	SEE PLUMBING/ MECHANICAL CODE AND POTABLE WATER REQUIREMENTS; CPVC TO BE USED FOR HOT WATER	DARK BLUE
PW (1, 2, ETC.)	POTABLE WATER	≤2"	X		PE			F				SCH 80	DARK BLUE
PW (1, 2, ETC.)	POTABLE WATER	<4"		X	HDPE	NONE	FW	FW	NONE	150	150, H	HDPE FITTINGS REQUIRED	N/A
PW (1, 2, ETC.)	POTABLE WATER	≥4"		X	PVC	NONE	P, M	M, F	CM	150	150, H		N/A
PW (1, 2, ETC.)	POTABLE WATER	≤4"	X		SS	NONE	FW	FW	NONE	150	150, H	N/A	N/A
PW (1, 2, ETC.)	POTABLE WATER	> 4"	X		DI	CM	F, G	F, G	CM	150	150, H		DARK BLUE
PW (1, 2, ETC.)	POTABLE WATER	≥4"		X	DI	CM	P, M, F	M, F	CM	150	150, H		N/A
SDR	STORM DRAIN	< 4"		X	PVC	NONE	S	S	NONE	GRAVITY	WSDOT 7-17.03(2)F OR ISPPWC HYDROSTATIC	SCH 80	N/A
SDR	STORM DRAIN	≥4"		X	DI	CM	P, M	M, F		GRAVITY	WSDOT 7-17.03(2)F OR ISPPWC HYDROSTATIC	SEE PLUMBING/MECHANICAL CODE AND STORM DRAIN REQUIREMENTS	LIGHT GRAY
SDR	STORM DRAIN	≥4"		X	PVC	NONE	P	P	NONE	GRAVITY	WSDOT 7-17.03(2)F OR ISPPWC HYDROSTATIC		N/A

PROCESS PIPE SCHEDULE ABBREVIATIONS LEGEND					
PIPE AND FITTING JOINTS		TESTING TYPE		LININGS	
BW	BRAZE WELDED	H	HYDROSTATIC	CM	CEMENT MORTAR
F	FLANGED	P	PNEUMATIC	E	EPOXY (PROTECTO 401 FOR WASTEWATER, NSF APPROVED FUSION BONDED EPOXY FOR POTABLE WATER)
FW	FUSION WELDED			G	GLASS LINED
G	GROOVED END			NONE	NO LINING
M	MECHANICAL				
P	PUSH-ON RUBBER GASKETED				
S	SOCKET				
T	THREADED				
W	WELDED				
GENERAL NOTES:					
1) MATERIALS AS NOTED IN THE PLANS SHALL TAKE PRECEDENCE OVER THIS TABLE. IN THE EVENT MATERIALS ARE NOT SPECIFIED IN THE PLANS, CLARIFY WITH THE ENGINEER.					
2) PIPING LETTERING COLORS SHALL CONTRAST WITH THE SOLID PIPE COLOR (LETTERS SHALL BE WHITE OR BLACK).					
3) SEE SPECIFICATIONS FOR ADDITIONAL PIPING REQUIREMENTS.					
4) COORDINATE PIPE COLOR SCHEME WITH OWNER'S EXISTING COLOR CODING SYSTEM FOR PIPES.					
5) THE TERMS "GLDI" AND "DI WITH GLASS LINING" MAY BE USED ON THE PLANS INTERCHANGEABLY.					

PIPE MATERIAL ABBREVIATIONS	
AC	ASBESTOS CEMENT
CMP	CORRUGATED METAL PIPE
CPVC	CHLORINATED POLYVINYL CHLORIDE
CU	COPPER
DI	DUCTILE IRON
GALV	GALVANIZED STEEL/IRON
GLDI	GLASS LINED DUCTILE IRON
HDPE	HIGH DENSITY POLYETHYLENE
PE	POLYETHYLENE
PVC	POLYVINYL CHLORIDE
PVC/DWV	POLYVINYL CHLORIDE/DRAIN WASTE VENT
RCP	REINFORCED CONCRETE PIPE
SS	STAINLESS STEEL
STL	STEEL
*	EXISTING PIPE MATERIAL; CONTRACTOR VERIFY MATERIAL

PIPE USE ABBREVIATIONS	
DR	DRAIN
PW (1, 2, ETC.)	POTABLE WATER
SDR	STORMDRAIN
SS	SANITARY SEWER





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ORIGINAL SIGNED
BY: MICHELLE L. JOHNSON
13810
DATE ORIGINAL
SIGNED: 08/12/2022

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NO.	REVISION	DESCRIPTION	BY	DATE

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

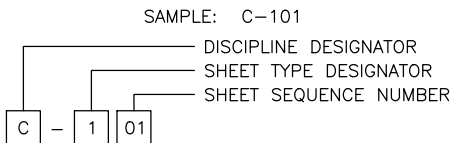
GENERAL
PIPING AND HVAC SCHEDULES
ABBREVIATIONS AND IDENTIFIERS

FILE : 21-18-022-100_G-001X
JUB PROJ. # : 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/4/2022
SHEET NUMBER:
G-003

LINE LEGEND

LINE DESCRIPTION	PROPOSED LINE	EXISTING LINE
POWER / COMMUNICATIONS		
OVERHEAD POWER	——— OHP ———	——— OHP ———
UNDERGROUND POWER	——— UP ———	----- UP -----
OVERHEAD TELEPHONE	——— OHT ———	----- OHT -----
UNDERGROUND TELEPHONE	——— UT ———	----- UT -----
FIBER OPTIC	——— F/O ———	----- F/O -----
CABLE TELEVISION	——— CTV ———	----- CTV -----
UNDERGROUND POWER, TEL, CABLE TV		----- P,T,CTV -----
UNDERGROUND POWER, TEL, CABLE TV, GAS		----- P,T,CTV,G -----
STORM DRAIN		
STORM DRAIN (GENERAL)	——— SD ———	----- SD -----
STORM DRAIN	——— X*SD ———	----- X*SD -----
ROOF DRAIN	——— RD ———	----- RD -----
SANITARY SEWER		
SANITARY SEWER (GENERAL)	——— SS ———	----- SS -----
SANITARY SEWER	——— X*SS ———	----- X*SS -----
SANITARY SEWER SERVICE	——— SS ——— SS ———	----- SS ----- SS -----
SEWER FORCE MAIN	——— FM ———	----- FM -----
WATER		
WATER (GENERAL)	——— W ———	----- W -----
WATER (SPECIFIED SIZE)	——— X"W ———	----- X"W -----
WATER SERVICE	——— WS ——— WS ———	----- WS ----- WS -----

SHEET NUMBERING



DISCIPLINE DESIGNATORS		
DISCIPLINE	DESIGNATOR	DESCRIPTION
GENERAL	G	ALL GENERAL
	GI	GENERAL INFORMATION
	GC	GENERAL CONTRACTUAL
	GR	GENERAL RESOURCE
SURVEY/MAPPING	V	ALL SURVEY
GEOTECHNICAL	B	ALL GEOTECHNICAL
CIVIL	C	ALL CIVIL
LANDSCAPE	L	ALL LANDSCAPE
STRUCTURAL	S	ALL STRUCTURAL
ARCHITECTURAL	A	ALL ARCHITECTURE
EQUIPMENT	Q	ALL EQUIPMENT
MECHANICAL	M	ALL MECHANICAL
ELECTRICAL	E	ALL ELECTRICAL
PLUMBING	P	ALL PLUMBING
PROCESS	D	ALL PROCESS
RESOURCE	R	ALL RESOURCE

LINE DESCRIPTION	PROPOSED LINE	EXISTING LINE
BOUNDARY		
PROPERTY LINE	—— P/L ——	—— P/L ——
PROPERTY LINE	—— - - - -	—— - - - -
RIGHT OF WAY	—— R/W ——	—— R/W ——
TEMPORARY EASEMENT	—— T/E ——	—— T/E ——
PERMANENT EASEMENT	—— P/E ——	—— P/E ——
TOWNSHIP AND RANGE		—— - - - -
SECTION LINE		—— - - - -
QUARTER SECTION LINE		—— - - - -
1/16 SECTION LINE		—— - - - -
STATE LINE		—— - - - -
COUNTY LINE		—— - - - -
SITE		
FENCE	—— X ——	—— - - - - X - - - -
MAJOR CONTOUR	—— 2521 ——	—— - - - -
MINOR CONTOUR	—— - - - -	—— - - - -
GRADE BREAK		—— GB ——
TOP OF BANK		—— TOB ——
TOE OF SLOPE		—— TOE ——
CUT LIMITS	—— - - - -	
FILL LIMITS		
DITCH	—— ... ——	—— ... ——
STORM SWALE	—— . . . ——	—— . . . ——
EDGE OF WATER		—— . . . ——
HIGH WATER		—— - - - -
WETLAND		—— WET ——
WETLAND BOG		—— BOG ——
WETLAND MARSH		—— MRSH ——
WETLAND SWAMP		—— SWMP ——

SHEET TYPE DESIGNATORS	
DESIGNATOR	SHEET TYPE
0	GENERAL (SYMBOLS, LEGENDS, NOTES, ETC.)
1	PLANS (HORIZONTAL VIEWS)
2	ELEVATIONS, PROFILES, COMBINED PLAN & PROFILES
3	SECTIONS (SECTIONAL VIEWS)
4	LARGE-SCALE VIEWS (PLANS, ELEVATIONS, ECT.)
5	DETAILS OR COMBINED DETAILS AND SECTIONS
6	SCHEDULES AND DIAGRAMS
7	USER DEFINED
8	USER DEFINED
9	3D REPRESENTATIONS (ISOMETRICS, PERSPECTIVES, PHOTOS)



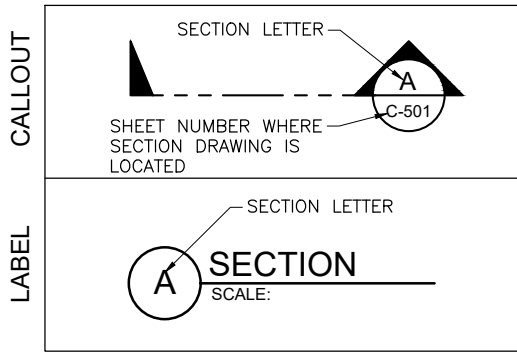
Know what's below.
Call before you dig.

LINE DESCRIPTION	PROPOSED LINE	EXISTING LINE
IRRIGATION		
IRRIGATION	—— IRR ——	- - - - IRR - - - -
GRAVITY IRRIGATION	—— GIRR ——	- - - - GIRR - - - -
PRESSURE IRRIGATION	—— PIRR ——	- - - - PIRR - - - -
POTABLE WATER	—— PW ——	- - - - PW - - - -
NON-POTABLE WATER	—— NPW ——	- - - - NPW - - - -
GAS		
NATURAL GAS	—— G ——	- - - - G - - - -
NATURAL GAS SERVICE	—— G —— G ——	- - - - G - - - - G - - - -
HIGH PRESSURE GAS	—— HPG ——	- - - - HPG - - - -
LIQUID GAS	—— LG ——	- - - - LG - - - -
UTILITY		
CHLORINE LINE	—— CHL ——	- - - - CHL - - - -
INDUSTRIAL WASTE WATER	—— IWW ——	- - - - IWW - - - -
DRAIN LINE		- - - - DL - - - -
ROADWAY		
ROAD SHOULDER	_____	_____
ROAD CENTERLINE	_____	_____
ROAD ASPHALT	_____	_____ EP _____
ROAD GRAVEL	_____	_____ EG _____
TOP BACK OF CURB	_____	_____
LIP OF GUTTER	_____	_____
LANDSCAPING LIMITS	—— LS ——	- - - - LS - - - -

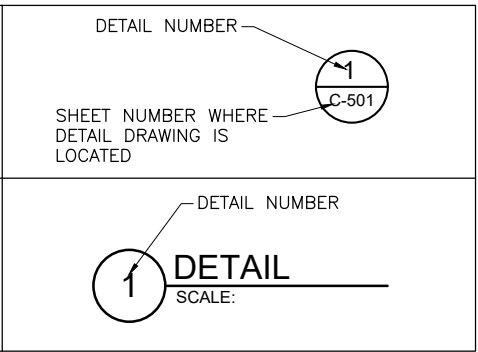
SECTION AND DETAIL IDENTIFIERS

NOTE:
A DASH MAY BE PLACED IN THE LOWER PORTION
OF THE IDENTIFIER IF THE DETAIL DRAWING OR
SECTION VIEW IS LOCATED ON THE SAME SHEET.

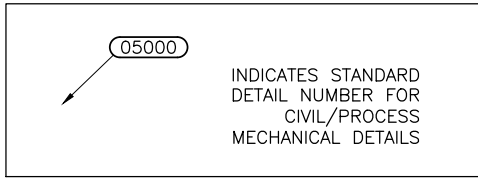
SECTION IDENTIFICATION



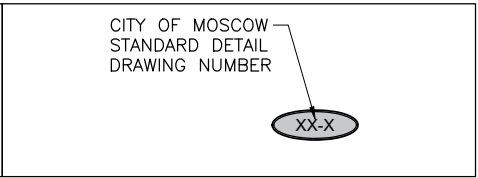
DETAIL IDENTIFICATION



STANDARD DETAIL IDENTIFICATION



CITY OF MOSCOW
STANDARD DETAIL



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BY: MICHELLE L.
JOHNSON
13810
DATE ORIGINAL
SIGNED: 08/12/2022

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BOOSTER STATION REPLACEMENTS - PHASE II REBID

CITY OF MOSCOW

GENERAL
LINE LEGEND, SHEET DESIGNATORS
SECTION AND DETAIL IDENTIFIERS

FILE : 21-18-022-100 G-001X

JUB PROJ. # : 21-18-022

DRAWN BY: WRH

DESIGN BY: LTS

CHECKED BY: MLJ

A horizontal scale bar with vertical end caps. The text "ONE INCH" is centered above the bar.

AT FULL SIZE, IF NOT ONE
INCH. SCALE ACCORDINGLY

LAST UPDATED: 8/4/2022

SHEET NUMBER:

G-004

SYMBOL DESCRIPTION	EXISTING SYMBOL	PROPOSED SYMBOL
SURVEY		
CAP (ALUMINUM)		
CAP (BRASS)		
CHISELED X		
CTRL PT GENERIC		
CTRL PT 1/2" REBAR		
CTRL PT 5/8" REBAR		
CTRL PT 60D NAIL		
CTRL PT HUB & TACK		
CTRL PT PK NAIL		
CTRL PT TEMP BENCH MARK		
NAIL		
NAIL AND TAG		
NAIL (PK)		
BOLT		
DRILL STEEL		
REBAR (1/2")		
REBAR (5/8")		
STAINLESS STEEL ROD		
IRON PIPE		
RAILROAD SPIKE		
R/W MONUMENT		
STONE		
SECTION CORNER. MON.		
SECTION QUARTER MON.		
SITE		
BOLLARD		
BOULDER		
DRINKING FOUNTAIN		
FLAGPOLE		
GATE		
MAIL BOX		
PARKING METER		
POST		
SIGN		
SPOT ELEVATION		
TREE (SHRUB)		
TREE (STUMP)		
TREE (CONIFEROUS)		
TREE (DECIDUOUS)		
TEST HOLE		
WELL		
WELL (MONITORING)		

SYMBOL DESCRIPTION	EXISTING SYMBOL	PROPOSED SYMBOL
UTILITIES		
MANHOLE (GENERIC)		
PRESSURE CLEAN OUT AT GRADE		
THRUST BLOCK		
VAULT		
COMMUNICATION		
TELE. MANHOLE		
TELE. PEDASTAL		
TELE. POLE		
TV PEDASTAL		
GUY WIRE		
DOMESTIC WATER		
FIRE HYDRANT		
SPIGOT		
YARD HYDRANT		
WATER MANHOLE		
WATER METER		
WATER VALVE		
ELECTRIC		
ELEC. MANHOLE		
ELEC. METER		
ELEC. TRANS.		
JUNCTION BOX		
POWER POLE		
POWER STUB		
STREET LIGHT		
TRAFFIC SIGNAL POLE		
IRRIGATION		
IRRIGATION VALVE		
IRRIGATION VALVE BOX		
SPRINKLER		
NATURAL GAS		
GAS METER		
GAS VALVE		
SANITARY SEWER		
CLEANOUT		
SEWER STUB		
SS MANHOLE		
STORM DRAIN		
CATCH BASIN		
DRY WELL		
FLARE END		
GREASE TRAP		
SD MANHOLE		

SYMBOL DESCRIPTION	EXISTING SYMBOL	PROPOSED SYMBOL
FITTINGS		
BEND (11.25°)		
BEND (22.5°)		
BEND (45°)		
BEND (90°)		
CAP		
COUPLING		
CROSS		
REDUCER (CONCENTRIC)		
REDUCER (ECCENTRIC)		
TEE		
TRUE UNION		
WYE		
VALVES		
AIR VALVE		
BLOW OFF		
COMBO VALVE		
BALL VALVE (N.C.)		
BALL VALVE (N.O.)		
BUTTERFLY VALVE		
CHECK VALVE		
CHECK VALVE (FLANGE)		
CHECK VALVE (MJ)		
GATE VALVE		
PLUG VALVE (N.C.)		
PLUG VALVE (N.O.)		
ROAD MARKINGS		
TURN ARROW		
ARROW STRAIGHT		
ARROW STRAIGHT/TURN		
BICYCLE ROUTE		
CAR		
HANDICAP SYMBOL		
ROADWAY		
INTERSTATE ROUTE		
MAST ARM		
PEDESTRIAN SIGNAL		
STATE ROUTE		
TRAFFIC LIGHT		

SYMBOL DESCRIPTION	EXISTING SYMBOL	PROPOSED SYMBOL
ROADWAY (CONT.)		
TYPE 2 BARRICADE		
US ROUTE		
TRAFFIC ATTENUATOR		
JERSEY BARRIER		

ABBREVIATIONS	
ASSY	ASSEMBLY
>	ANGLE
@	AT (MEASUREMENTS)
BLDG	BUILDING
BM	BENCH MARK
BSC	BITUMINOUS SURFACE COURSE
BSW	BACK OF SIDEWALK
BW	BOTH WAYS
C	CHANNEL (STRUCTURAL)
C/L	CENTER LINE
CMP	CORRUGATED METAL PIPE
CO	CLEANOUT
CONC	CONCRETE
CONT	CONTINUOUS
CPLG	COUPLING
CU FT	CUBIC FEET
CU YD	CUBIC YARD
DEG OR °	DEGREE
DET	DETAIL
DIA OR Ø	DIAMETER
DIP	DUCTILE IRON PIPE
DIST	DISTRIBUTION
DWG	DRAWING
EA	EACH
ELB	ELBOW
ELEV	ELEVATION
EW	EACH WAY
EXIST	EXISTING
FG	FINISH GRADE
FH	FIRE HYDRANT
FLG	FLANGE
FT OR '	FEET
GV	GATE VALVE

ABBREVIATIONS	
HORIZ	HORIZONTAL
ID	INSIDE DIAMETER
IN OR "	INCH
LB OR #	POUND
LF	LINEAL FEET
LN	LINEAL
MAX	MAXIMUM
MIN	MINIMUM
NO OR #	NUMBER
PE	POLYETHYLENE
PL	PLATE
PL	PROPERTY LINE
PVC	POLYVINYL-CHLORIDE
R	RADIUS
RP	RADIUS POINT
R&R	REMOVE & REPLACE
REM	REMOVE
REQ'D	REQUIRED
REV	REVISION
R/W	RIGHT-OF-WAY
S	SLOPE
SPEC	SPECIFICATION
STA	STATION
STD	STANDARD
STL	STEEL
ST STL	STAINLESS STEEL
TBC	TOP BACK OF CURB
Typ	TYPICAL
TFC	TOP FACE OF CONCRETE
W/	WITH
W/O	WITHOUT
W/REQ'D	WHERE REQUIRED



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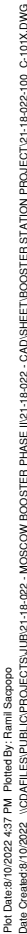
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ORIGINAL SIGNED
BY: MICHELLE L.
JOHNSON
13810
DATE ORIGINAL
SIGNED:08/12/2022

[illegible]

BOOSTER STATION REPLACEMENTS - PHASE II REBID CITY OF MOSCOW

FILE: 21-18-022-100_G-001X
JUB PROJ. #: 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ
 AT FULL SCALE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/4/2022
SHEET NUMBER:



GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE A MINIMUM BURY DEPTH OF 4.5' ON ALL WATERMAIN.
2. CONTRACTOR SHALL RETAIN AND PROTECT ALL EXISTING UTILITIES.
3. CONTRACTOR SHALL PROVIDE BACKFILL PER CITY STANDARD.
4. EXISTING UTILITIES ARE APPROXIMATE IN LOCATION BASED ON BEST AVAILABLE INFORMATION. CONTRACTOR SHALL POTHOLE PRIOR TO WORK TO CONFIRM LOCATION, SIZE AND MATERIAL.

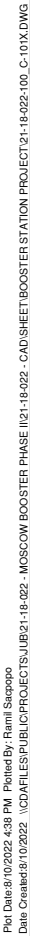


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INDIAN HILLS BOOSTER PUMP STATION SITE AND GRADING PLAN

C-102



Page 1354



SCALE: 0 10 20
SCALE IN FEET

Page 1355

GENERAL NOTES:

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2. CONTRACTOR SHALL RETAIN AND PROTECT ALL EXISTING UTILITIES.
3. CONTRACTOR SHALL PROVIDE BACKFILL PER CITY STANDARD.
4. EXISTING UTILITIES ARE APPROXIMATE IN LOCATION BASED ON BEST AVAILABLE INFORMATION. CONTRACTOR SHALL POTHOLE PRIOR TO WORK TO CONFIRM LOCATION, SIZE AND MATERIAL.

ORIGINAL SIGNED
BY: MICHELLE L.
JOHNSON
13810
DATE ORIGINAL
SIGNED: 08/12/2022

[illegible]

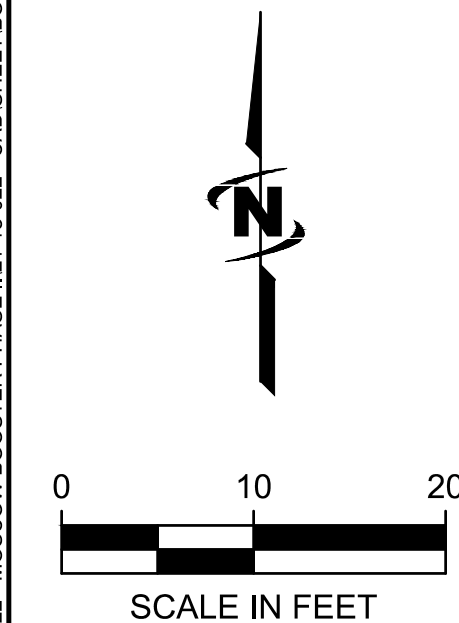
BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

CIVIL

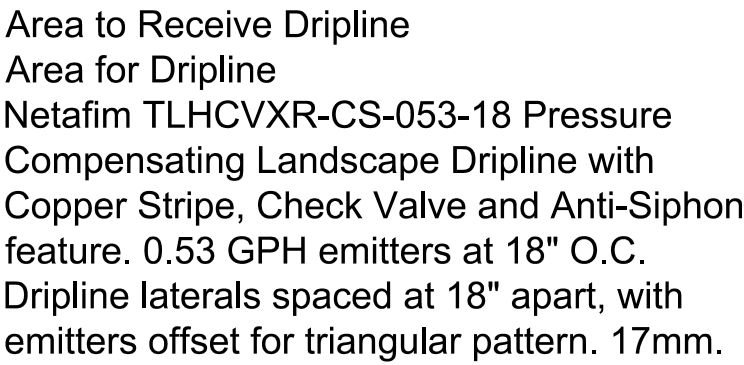
PONDEROSA BOOSTER PUMP STATION
YARD PIPING PLAN

FILE : 21-18-022-100_C-101X
JUB PROJ. #: 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ
 AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/10/2022
SHEET NUMBER:
C-103





<u>SYMBOL</u>	<u>MANUFACTURER/MODEL/DESCRIPTION</u>
	Drip Control Valve Assembly Hunter ICZ-101-25. Drip Control Zone Kit. 1" ICV Globe Valve with 1" HY100 filter system. Pressure Regulation: 25psi. Flow Range: 2 GPM to 20 GPM. 150 mesh stainless steel screen.



Master Valve Assembly 1"
Hunter ICV-G-FS. 1", 1-1/2", 2", and 3" Plastic
Electric Master Valve, Globe Configuration,
with NPT Threaded Inlet/Outlet, for
Commercial/Municipal Use. With Filter Sentry

Manual Drain Valve Assembly
Apollo Bronze ball valve with weld top
(78-621-01) 3/4" or approved equal.

Controller
Hunter HPC-400. 4 Station Indoor/Outdoor
Wi-Fi enabled, full-functioning controller with
touchscreen, Commercial Use. Plastic
Cabinet.

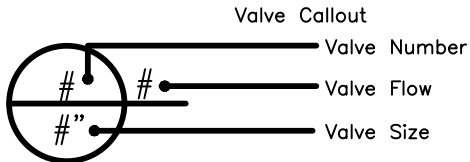
Portable Remote Controller
Hunter ROAM-KIT. Transmitter, and Receiver
Roam Remote allows for controller operation
up to 1000 Feet. Residential/Light
Commercial Use. Works with Hunter ACC,
I-Core, Pro-C, PCC, and X-Core Controllers.
SmartPro wiring harness included.

Flow Sensor
Hunter HC-075-FLOW. 3/4" Flow meter for use with Hydrowise enabled controller to monitor flow and provide system alerts. Also functions as stand alone flow totalizer/sub meter on any residential or commercial irrigation system.

Point of Connection 1"
Connect to Backflow Prevention Device on
South East Corner of Building. Coordination
Location with Owner.

Irrigation Lateral Line: PVC Schedule 40

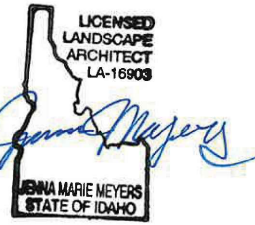
Irrigation Mainline: PVC Schedule 40



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REVISION					
NQ	DESCRIPTION	BY	APR	DATE	

BOOSTER STATION REPLACEMENTS - PHASE II REBID

CITY OF MOSCOW

PONDEROSA IRRIGATION PLAN

FILE : 21-18-022-100_LI-101X

JUB PROJ. # : 21-18-022

DRAWN BY: WRH

DESIGN BY: LTS

CHECKED BY: ML



ONE INCH

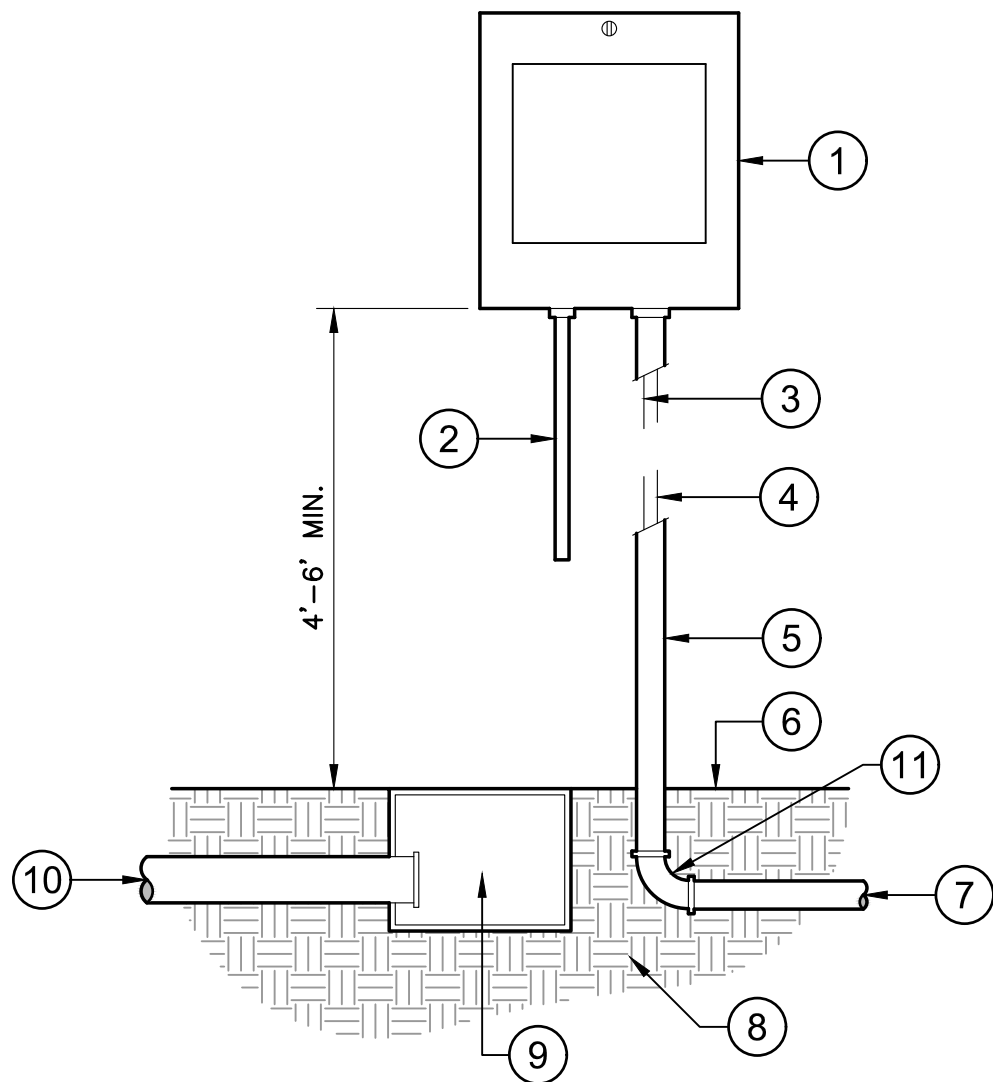
AT FULL SIZE, IF NOT ONE

LAST UPDATED: 8/11/2022

SHEET NUMBER:

LI-101

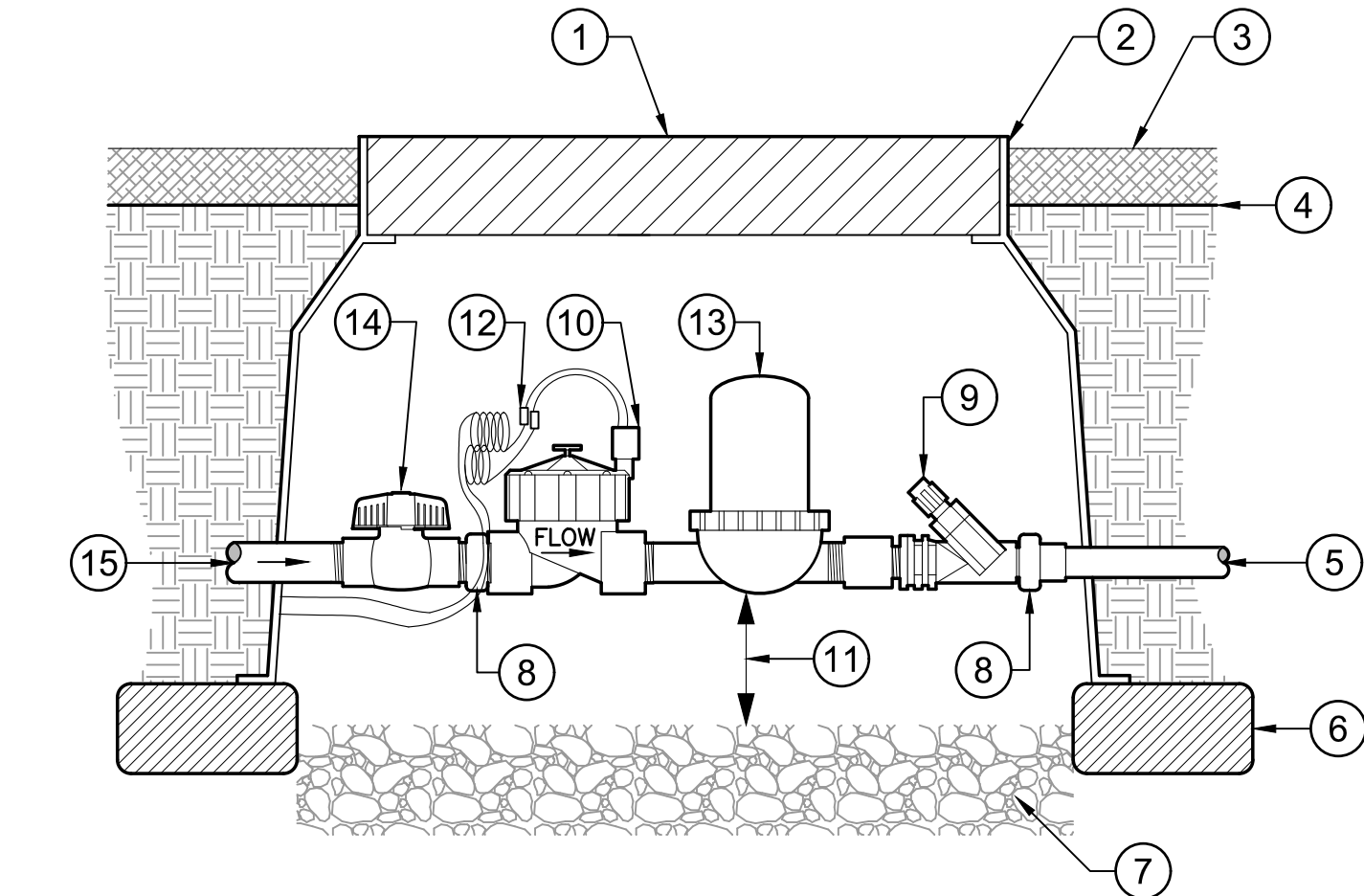
Plot Date: 8/11/2022 11:21 AM Plotted By: Andrew Norlander
Date Created: 8/10/2022 IGCAD LISTS PUBLIC PROJECTS: JUB21-18-022 - MOSCOW BOOSTER STATION PHASE II 21-18-022 - CAD SHEET BOOSTER STATION PROJECT 21-18-022-100 LI-501.DWG



- 1 CONTROLLER ENCLOSURES WITH CONTROLLER – SEE IRRIGATION EQUIPMENT SCHEDULE
- 2 120–VOLT WIRE IN RIGID CONDUIT
- 3 COMMON WIRE
- 4 CONTROL WIRES
- 5 CONDUIT TO MAIN LINE
- 6 FINISHED GRADE
- 7 UF DIRECT–BURIAL WIRES TO REMOTE CONTROL VALVES
- 8 SUBGRADE COMPACTED TO 95% MDD
- 9 ELECTRICAL PULL BOX (IF REQUIRED)
- 10 3" CONDUIT FOR FUTURE EXPANSION (IF REQUIRED)
- 11 SWEEP ELL FITTING

1 WALL-MOUNT CONTROLLER

NTS

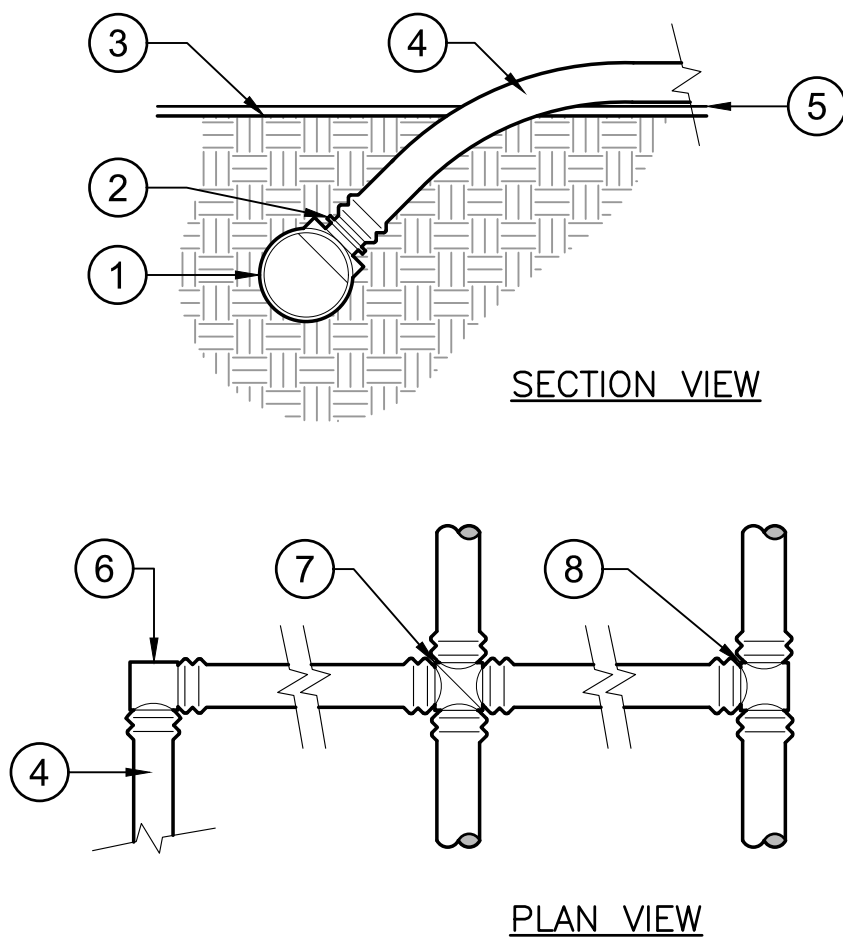


- 1 18" JUMBO GREEN PLASTIC VALVE BOX W/ BOLT LOCK (CARSON OR APPROVED EQUAL)
- 2 1" MAX. CLEARANCE
- 3 PLANTING BED MULCH – SEE PLANTING NOTES FOR DEPTH
- 4 FINISHED GRADE
- 5 PVC SUPPLY HEADER
- 6 CONCRETE PAVERS ONLY
- 7 4" MIN. PEA GRAVEL
- 8 ACTION UNION – PART 18010–XX, PART 18011–XX, PART 18012
- 9 INLINE PRESSURE REGULATOR
- 10 ELECTRIC CONTROL VALVE – SEE IRRIGATION EQUIPMENT SCHEDULE
- 11 2" MIN. CLEARANCE
- 12 (2) 3M DBR/Y WATER TIGHT WIRE CONNECTORS
- 13 INLINE 1" FILTER
- 14 PLASTIC PVC BALL VALVE (LINE SIZE)
- 15 FLOW FROM PVC MAIN LINE

2 DRIP ZONE CONTROL VALVE ASSEMBLY W/ PVC BALL VALVE

NTS

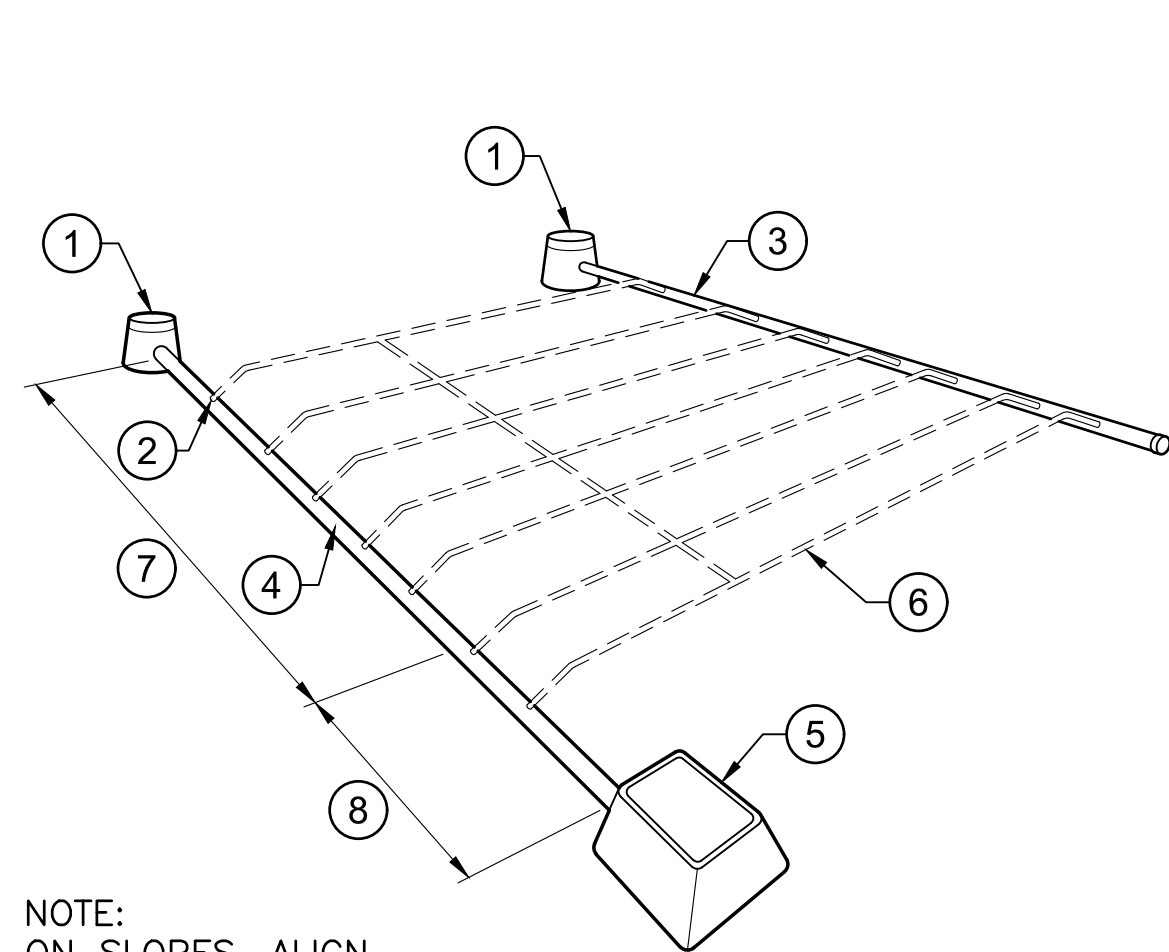
JUB–IR–DRI–CONT–02



- 1 1 1/2" PVC HEADER
- 2 NETAFIM TLIAPVC CONNECTION
- 3 PLANTING BED FINISHED GRADE
- 4 DRIPLINE / BLANK TUBING
- 5 WEED BARRIER FABRIC
- 6 ELBOW
- 7 CROSS
- 8 TEE

3 DRIPLINE CONNECTIONS

NTS

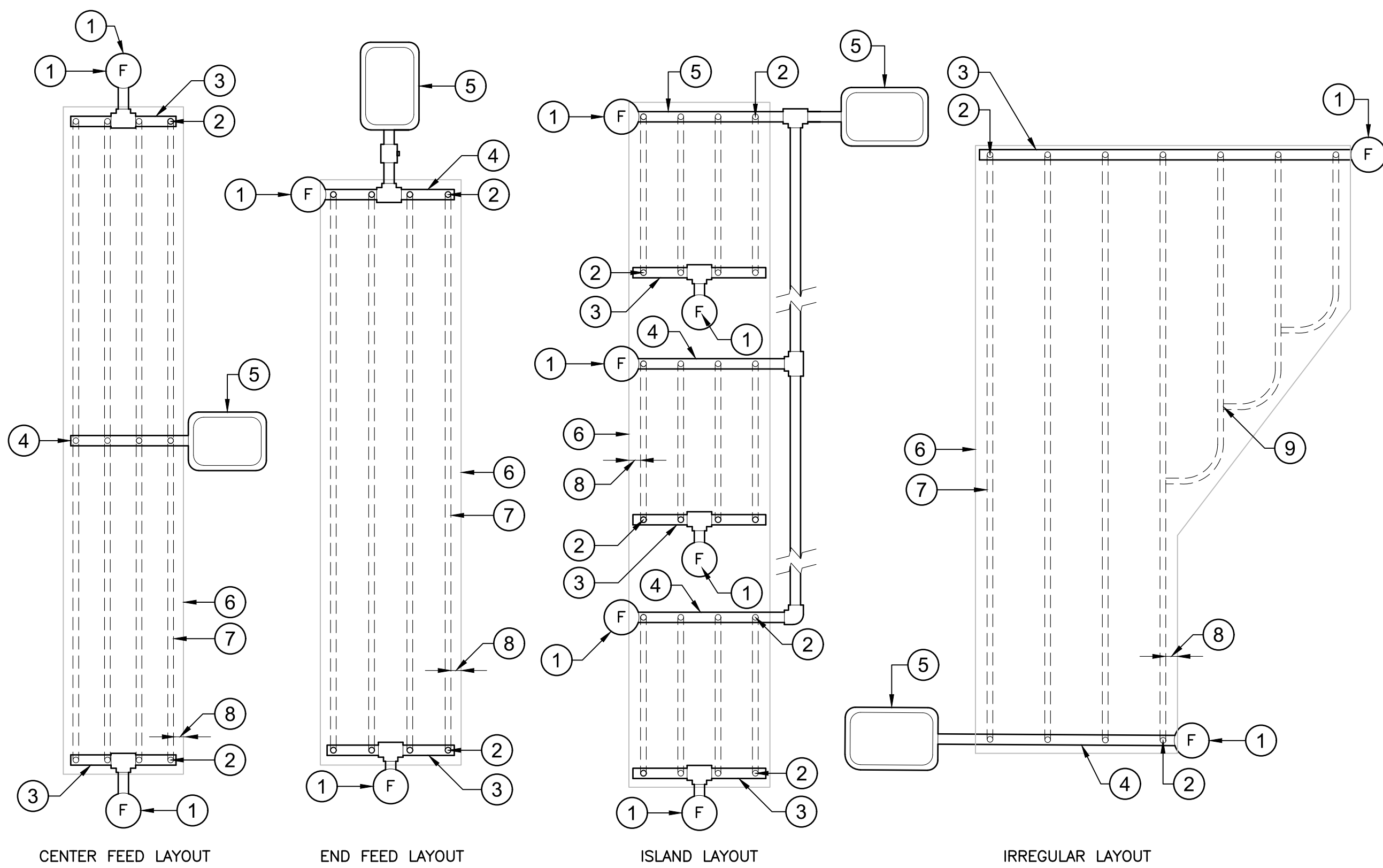


NOTE:
ON SLOPES, ALIGN
DRIPLINE PARALLEL TO
THE CONTOURS OF THE
SLOPE.

- 1 MANUAL FLUSH VALVE PLUMBED TO PVC IN LOWEST POINT
- 2 NETAFIM TLIAPVC CONNECTOR
- 3 1 1/2" PVC EXHAUST HEADER (SEE NOTES FOR DEPTH)
- 4 1 1/2" PVC SUPPLY HEADER (SEE NOTES FOR DEPTH)
- 5 REMOTE CONTROL VALVE ASSEMBLY
- 6 DRIPLINE TUBING LATERAL – INSTALL AT GRADE UNDER MULCH AND ON TOP OF FABRIC (IF FABRIC IS USED)
- 7 ON SLOPES, USE THE SPECIFIED DRIPLINE SPACING ON THE TOP 2/3 OF THE SLOPE
- 8 ON SLOPES, USE THE SPECIFIED DRIPLINE SPACING PLUS 25% ON THE BOTTOM 1/3 OF SLOPE

4 DRIPLINE CIRCUIT LAYOUT

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- 1 MANUAL FLUSH VALVE PLUMBED TO PVC IN LOWEST POINT
- 2 NETAFIM TLIAPVC CONNECTOR
- 3 1 1/2" PVC EXHAUST HEADER
- 4 1 1/2" PVC SUPPLY HEADER
- 5 REMOTE CONTROL VALVE ASSEMBLY
- 6 AREA PERIMETER
- 7 DRIPLINE TUBING LATERAL
- 8 PERIMETER DRIPLINE TUBING LATERALS 2" TO 4" FROM EDGE
- 9 DRIPLINE TEE

5 INLINE DRIP LAYOUTS (TYP.)

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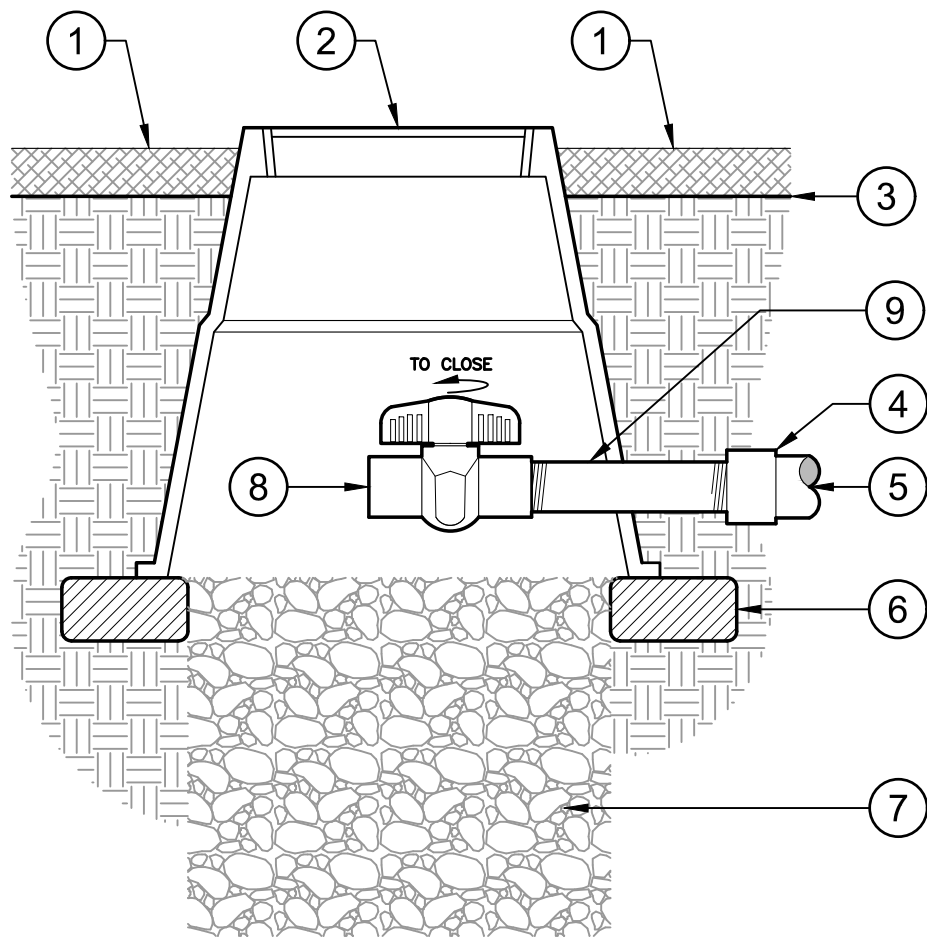
BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

IRRIGATION DETAILS

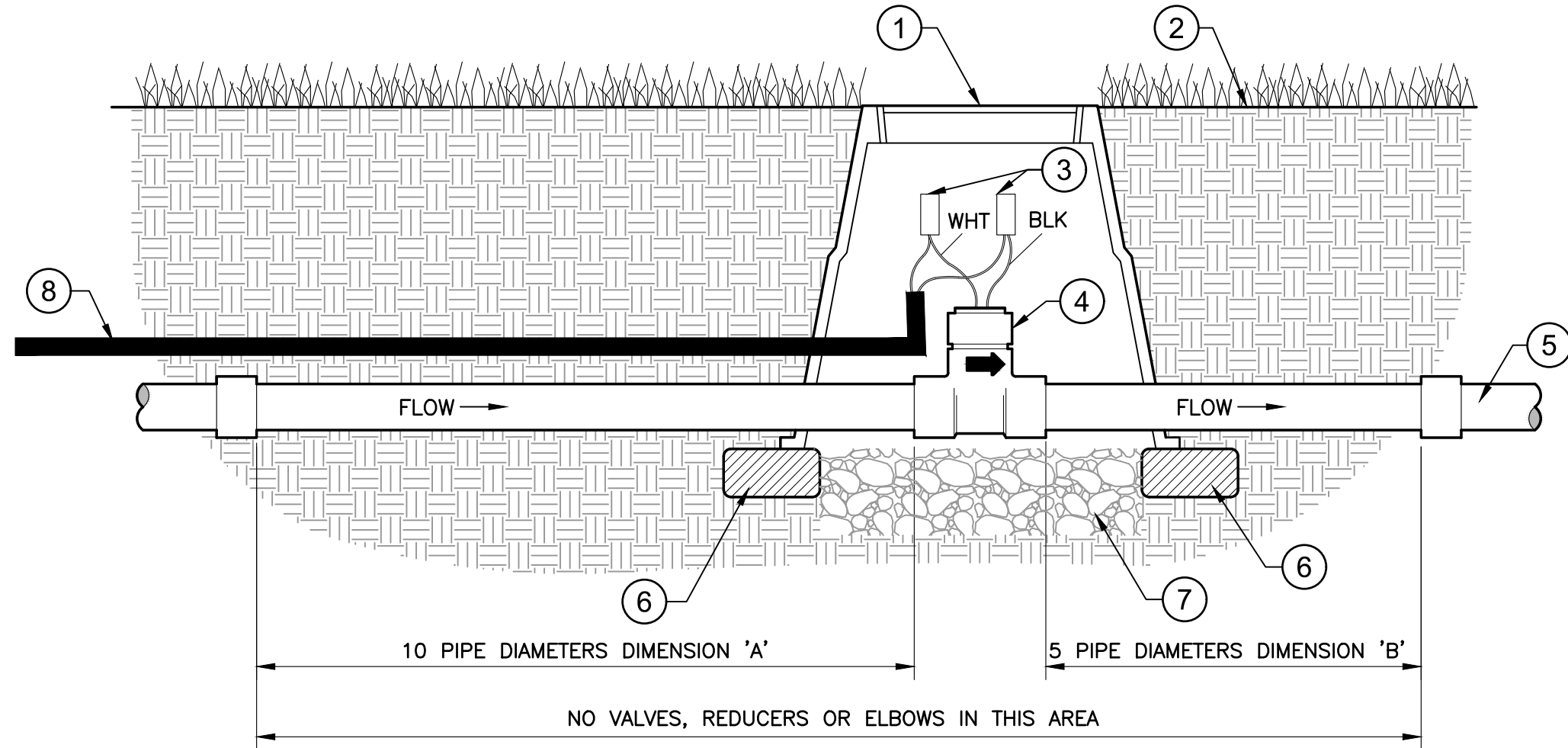
FILE: 21-18-022-100_LI-501X
JUB PROJ. #: 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

LI-501

Plot Date: 8/11/2022 11:21 AM Plotted By: Andrew Noorlander
Date Created: 8/10/2022 MDC:\FILES\PUBLIC\PROJECTS\SUB21-18-022 - MOSCOW BOOSTER PHASE II\2-18-022 - CAD SHEET BOOSTER STATION PROJECT\21-18-022-100 LI-502.DWG



- 1 PLANTING BED MULCH – SEE PLANTING NOTES FOR DEPTH
- 2 8" ROUND GREEN PLASTIC VALVE BOX (CARSON OR APPROVED EQUAL) FLUSH WITH MULCH GRADE
- 3 FINISHED GRADE
- 4 PVC REDUCER BUSHING (SP X 1/2") FIPT – SIZE AS REQUIRED
- 5 PVC EXHAUST HEADER
- 6 CONCRETE PAVERS ONLY
- 7 1 C.F. WASHED PEA GRAVEL
- 8 1/2" PLASTIC PVC BALL VALVE
- 9 1/2" X 6" (SCH. 80 PVC) NIPPLE TBE



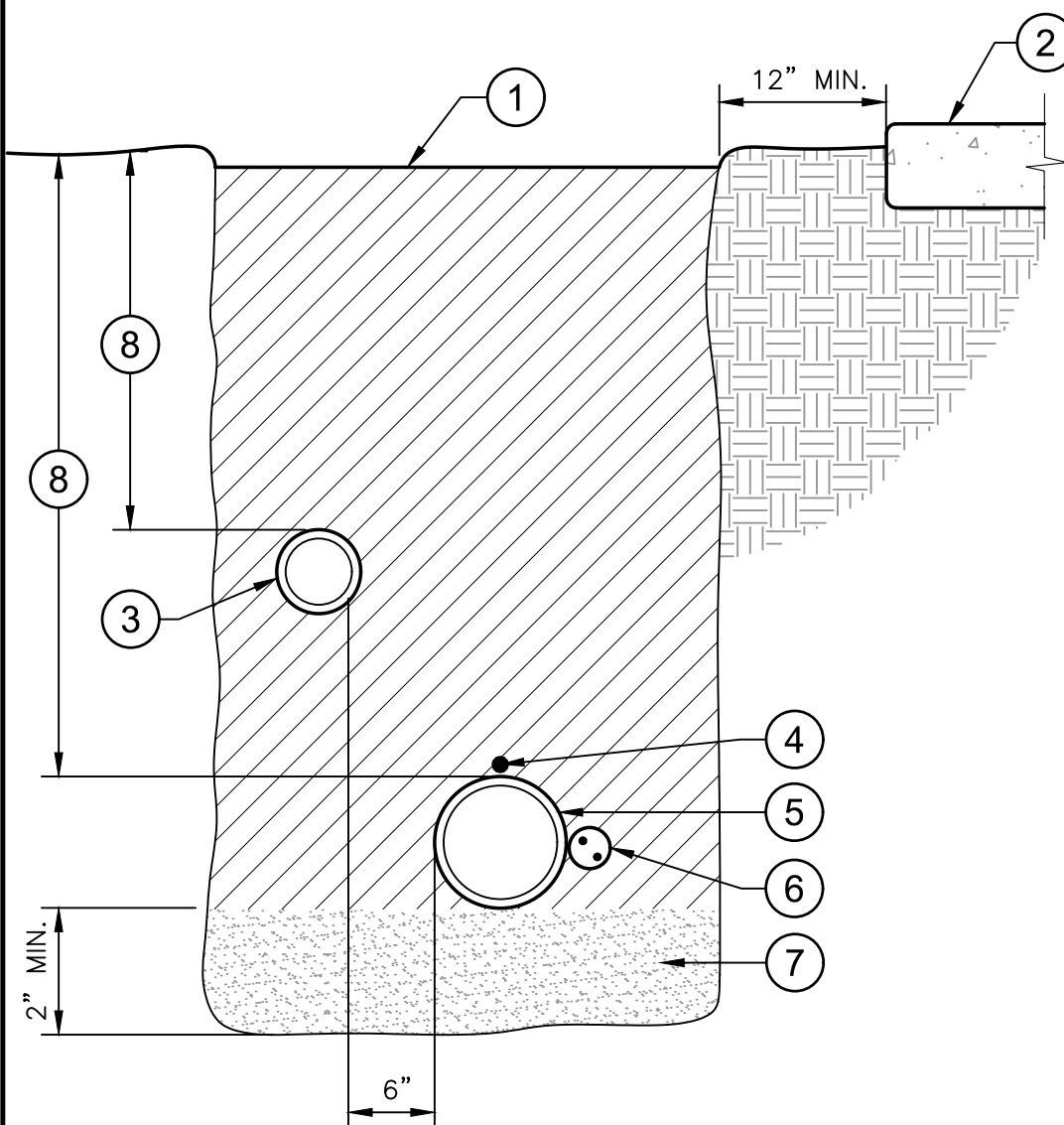
- 1 10" ROUND GREEN PLASTIC VALVE BOX W/ BOLT LOCK (CARSON OR APPROVED EQUAL, MARKED "F.S." IN 2" WHITE LETTERS)
- 2 FINISHED GRADE
- 3 (2) 3 M DBR/Y WATER TIGHT WIRE CONNECTORS
- 4 FLOW SENSOR – SEE IRRIGATION EQUIPMENT SCHEDULE
- 5 PVC MAIN LINE
- 6 CONCRETE PAVERS ONLY
- 7 4" MIN. PEA GRAVEL
- 8 SENSOR CABLE TO CONTROLLER

1 DRIP FLUSH VALVE (PLUMBED TO PVC EXHAUST HEADER)

NTS

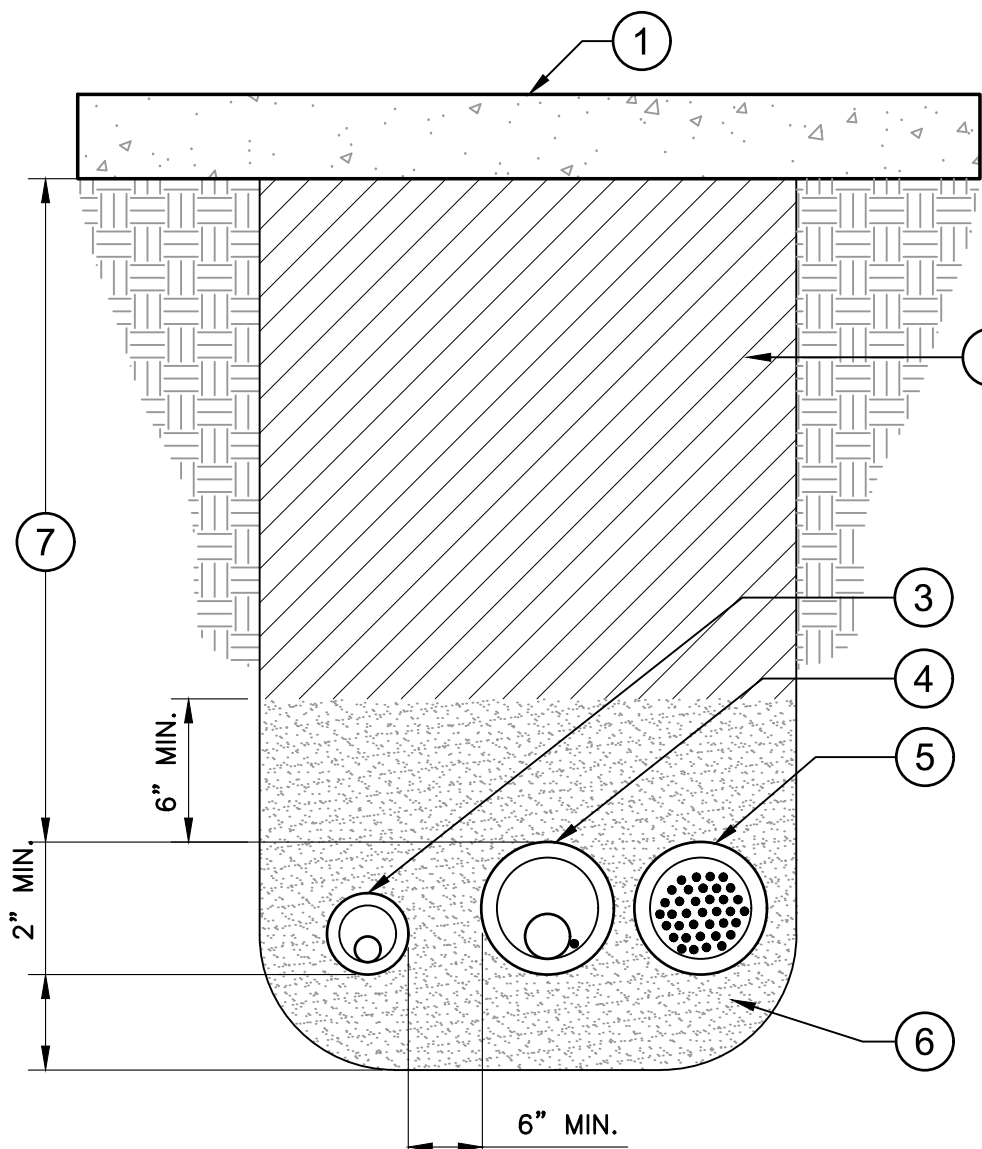
2 FLOW SENSOR ASSEMBLY

NTS



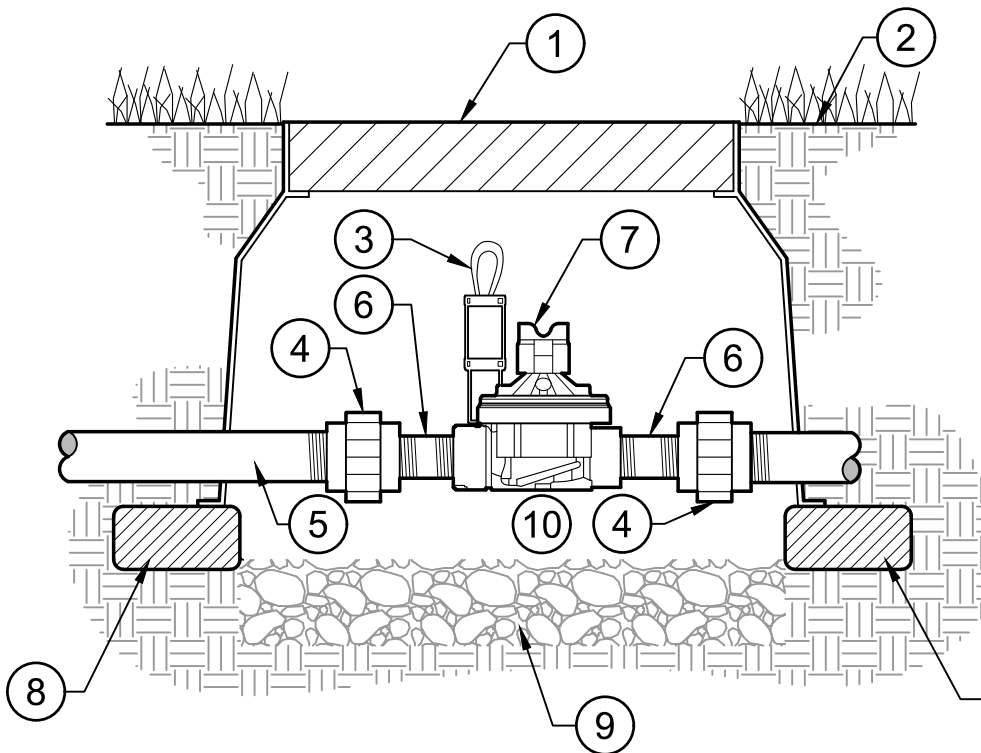
- 1 BACKFILL MATERIAL – SEE NOTES, COMPACT TO 90% MDD
- 2 ADJACENT HARD SURFACE
- 3 NON-PRESSURE LATERAL LINE
- 4 MAIN LINE LOCATOR WIRE; BURIED WITH ALL MAIN LINES
- 5 PVC MAIN LINE
- 6 DIRECT BURIAL, LOW VOLTAGE CONTROL WIRES; TO BE BURIED AND TAPED AT 10' INCREMENTS. LOCATE DIRECTLY ADJACENT TO MAIN LINE.
- 7 BEDDING MATERIAL – SEE NOTES
- 8 PIPE DEPTHS – SEE NOTES

NOTE: SEE SLEEVING DETAIL FOR TRENCHING IN PAVED AREAS.



- 1 HARDSCAPE SURFACE – SEE PLANS
- 2 BACKFILL MATERIAL – SEE NOTES
- 3 LATERAL LINE WITH SLEEVE
- 4 PVC MAIN LINE AND LOCATOR WIRE WITH SLEEVE
- 5 CONTROL WIRE SLEEVE – SEE PLANS FOR SIZE
- 6 BEDDING MATERIAL – SEE NOTES
- 7 MIN. COVER – 12" UNDER WALKS AND 18" UNDER STREETS

NOTES:
1) SLEEVES 4" AND SMALLER USE PVC SCHEDULE 40 PIPE.
2) SLEEVES LARGER THAN 4" USE PVC CLASS 200.
3) ALL SLEEVES SHALL BE TWO (2) TIMES LARGER THAN THE DIAMETER OF THE PIPE BEING SLEEVED, UNLESS NOTED OTHERWISE ON THE PLANS.
4) INSTALL SLEEVES AT A DEPTH SUFFICIENT TO AVOID CONFLICT WITH OTHER UTILITIES AND MAINS.



- 1 18" GREEN JUMBO 1220 VALVE BOX W/ BOLT LOCK (CARSON OR APPROVED EQUAL). USE BOX EXTENSIONS AS NEEDED.
- 2 FINISHED GRADE
- 3 WIRES TO CONTROLLER INTERFACE – 18 GAUGE MIN. WIRE SIZE
- 4 ACTION UNION
- 5 PVC MAIN LINE
- 6 SCHEDULE 80 NIPPLE (LENGTH AS REQUIRED)
- 7 MASTER VALVE – SEE IRRIGATION EQUIPMENT SCHEDULE
- 8 CONCRETE PAVERS ONLY
- 9 4" MIN. PEA GRAVEL
- 10 2" MIN. CLEARANCE

3 TRENCH DETAIL

NTS

JUB-IR-PIP-01

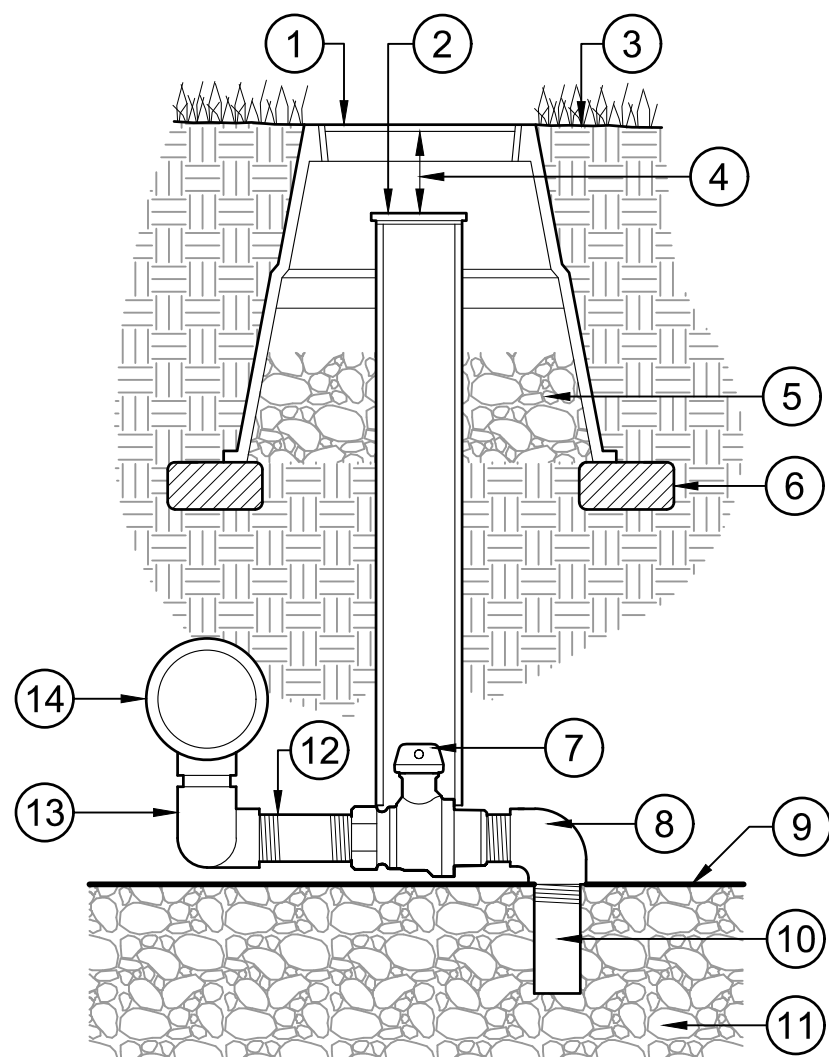
4 SLEEVE DETAIL

NTS

JUB-IR-PIP-02

5 MASTER VALVE ASSEMBLY

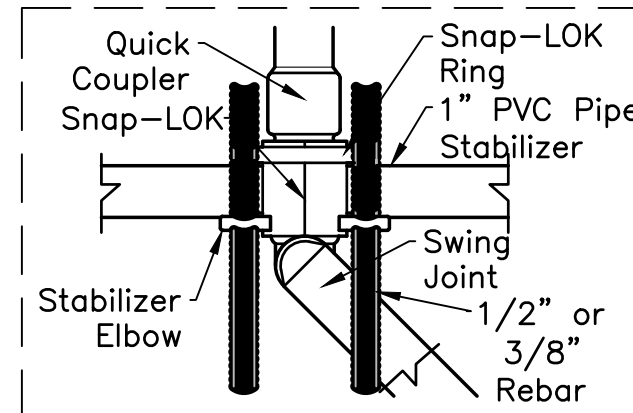
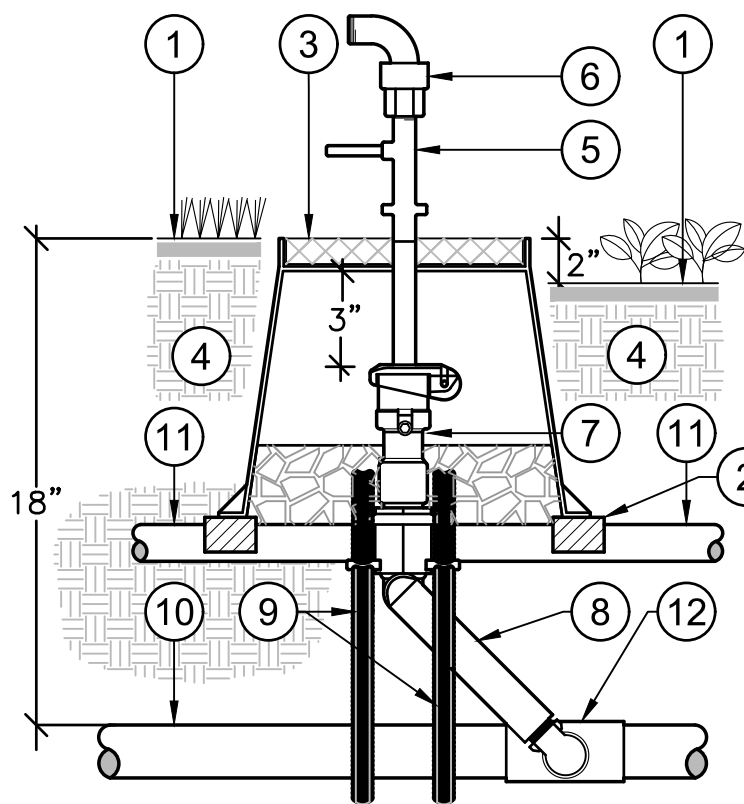
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- 1 10" ROUND GREEN PLASTIC VALVE BOX WITH BOLT LOCK (CARSON OR APPROVED EQUAL)
- 2 4" PVC SCHEDULE 40 PIPE SLEEVE (NOTCH TO FIT PIPE), CAPPED BY YELLOW CAM LOCK SNUG CAP
- 3 FINISHED GRADE
- 4 3" MIN. 6" MAX. CLEARANCE
- 5 4" MIN. PEA GRAVEL
- 6 CONCRETE PAVERS ONLY
- 7 3/4" VALVE – SEE IRRIGATION EQUIPMENT SCHEDULE
- 8 3/4" 90 DEGREE STREET ELL

- 9 FILTER FABRIC COVERING SUMP
- 10 3/4" X 6" PVC SCHEDULE 80 TOE NIPPLE
- 11 3/4" GRAVEL SUMP – 6 C.F. MIN. SIZE
- 12 3/4" X 12" PVC SCHEDULE 80 NIPPLE
- 13 (2) FIPT X FIPT 90 DEGREE ELL, (2) 3/4" X CLOSE PVC NIPPLE
- 14 PVC MAIN LINE AND SERVICE TEE

NOTE: MAIN LINE SHALL GRAVITY DRAIN TO MANUAL DRAIN VALVE. MANUAL DRAIN VALVE SHALL BE PLACED IN ALL LOW SPOTS AND WHERE SHOWN ON THE PLAN.



- 1 FINISH GRADE
- 2 4 X 4 PRESSURE TREATED WOOD TIMBER FRAME
- 3 10" ROUND GREEN PLASTIC VALVE BOX W/ BOLT LOCK (CARSON OR APPROVED EQUAL)
- 4 APPROVED BACKFILL
- 5 QUICK COUPLER KEY
- 6 QUICK COUPLER HOSE SWIVEL
- 7 QUICK COUPLER VALVE (SEE IRRIGATION EQUIPMENT SCHEDULE)
- 8 LASCO STANDARD UNITIZED SWING JOINT, WITH SNAP-LOK STABILIZER ELBOW OUTLET. NOTE: INLET IS MIPT, OUTLET IS BRASS MIPT w/SNAP LOK
- 9 3/8" OR 1/2" X 24" REBAR (2) REQUIRED
- 10 MAINLINE PIPE, PVC – SEE IRRIGATION PLAN
- 11 1" PVC PIPE STABILIZER (OPTIONAL)
- 12 SERVICE TEE OR ELBOW, SCH40. (SIZE PER PLAN), SIZE TEE/ELBOW FIPT OUTLET BASED ON MIPT INLET SIZE OF THE SWING JOINT

6 MANUAL DRAIN VALVE ASSEMBLY

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7 QUICK COUPLING VALVE ASSEMBLY

NTS



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NO.	DESCRIPTION	BY	DATE

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

IRRIGATION DETAILS

FILE: 21-18-022-100 LI-502X
JUB PROJ. #: 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

LI-502

Plot Date: 11/20/22 11:21 AM Plotted By: Andrew Norlander
Date Created: 10/20/22 UG04FILES\PUBLIC\PROJECTS\SUB21-18-022- MOSCOW BOOSTER STATION PHASE II\21-18-022- CAD\SHEET\BOOSTER STATION PROJECT\21-18-022-100 LP-001.DWG

PLANTING NOTES

1.

The Contractor shall be familiar with the planting and irrigation technical specifications -- failure to do so will not relieve the contractor of his responsibility to fulfill all requirements in said specifications.
2.

Prior to any planting operations, the irrigation system shall be fully operational and all planting areas shall be thoroughly moistened.
3.

The planting plan is diagrammatic, and all plant locations are approximate. Plant symbols take precedence over plant quantities shown on the plans and in the Plant Material Schedule. The Contractor shall verify all plant quantities and notify the Landscape Architect of any discrepancies between the quantities and the symbols shown. The Plant Materials Schedule is for the Contractor's convenience only.
4.

No substitution of size, grade, variety or any species shall be permitted except by written permission of the Landscape Architect. Upon receiving Notice to Proceed, the Contractor shall provide written proof that the specified plant material is available and has been secured or reserved specifically for this project. Obtain nursery stock and other plant materials from reliable and stable sources prior to order and delivery.
5.

Final Grade Preparation

A. The subgrade Material shall be rough graded to plus or minus one tenth (+0.1) foot of the final rough grade, which will allow the Contractor to achieve final finished grade through the placement of the topsoil.

B. Protect existing trees, shrubs, lawns, existing structures, fences, roads, sidewalks, paving, curb and gutter and other features during Construction.

C. Protect above or below grade utilities. Contact utility companies to repair damage to utilities. Contractor shall pay all cost of repairs which he causes.

D. Maintain all benchmarks, control monuments and stakes, whether newly established by surveyor or previously existing. Protect from damage and dislocation.

E. Grading Intent: Spot elevations and contours indicated are based on the best available data. The intent is to maintain constant slopes between spot elevations.

F. Conduct work in an orderly manner. Do not create a nuisance. Do not permit soil accumulation on streets or sidewalks. Do not allow soil to be washed into sewers and storm drains.

G. Grade slopes to provide adequate drainage after compaction. Do not create water pockets or ridges. Use all means necessary to prevent erosion of freshly graded areas during construction until surfaces have been constructed and landscaping areas have taken hold.

H. Grades shall be smooth, even, and maintain a consistent uniform slope. Grades with undulating surfaces will be rejected and require re-grading.

I. The Contractor shall maintain a minimum of two (2) percent drainage away from all buildings, structures, and walls. Finished grades shall be smoothed to eliminate puddling or standing water.

J. All finished grades shall be approved by the Landscape Architect prior to installation of any plant materials.
6.

All planting areas shall receive a minimum of four (4) inches of imported topsoil in turf areas and twelve (12) inches in planting beds. All topsoil used on this project shall meet the following criteria:

A. pH:.....5.5 – 8.0

B. EC (electrical conductivity):.....<2.0 mmhos per centimeter

C. SAR (sodium absorption ratio):.....<3.0

D. % OM (percent organic matter):.....2%

E. Texture (particle size per USDA classification):

I. Sand:.....<70%

II. Silt:.....<70%

III. Clay:.....<30%

IV. Stone Fragments (gravels or any soil particle Greater than two (2) mm in size):.....<5% (by volume)

V. Rocks > 1.5":.....None

In addition, the topsoil shall be fertile, friable, natural loam and shall be capable of sustaining vigorous plant growth. It shall be free of stones, lumps, clods of hard earth, plants or their roots, sticks, and other extraneous matter. The topsoil shall contain neither noxious weeds nor their seeds. It shall not be used for planting operations while in a frozen or muddy condition. An appropriate fertilizer may be used to provide needed nutrients for healthy and vigorous plant growth. Follow recommendation of topsoil report.

7.

The following procedure shall be followed in placing all topsoil:

A. All areas to receive topsoil which have a slope of less than ten (10) percent shall be cross-ripped to a depth of four (4) to six (6) inches.

B. The surface of the subgrade shall be scarified to a depth of two (2) inches to provide a transition zone between the subgrade and the topsoil. Place the topsoil on the subgrade and fine grade to the final finished grade and topsoil depths as indicated on the drawings and in these notes.

C. Any required soil amendments (i.e. organic matter, fertilizer, gypsum, etc.) shall be placed directly on the topsoil at the required rates and spread evenly over the planting area. The amendments shall then be thoroughly blended into the topsoil to a depth of four (4) inches. Where only a dry, granular fertilizer is to be added, it may be applied to the surface and raked in during the fine grading process.

8.

The Contractor shall obtain a soil analysis from any authorized soil testing agency of any existing stockpiled or imported topsoil to be used on the project to verify that it conforms to the topsoil specifications. Test results shall include horticultural nutrient recommendations. The soil samples shall be obtained per the testing agency directions. Allow ten (10) working days to obtain test results. The costs for such testing shall be the responsibility of the Contractor. Prior to delivery of the imported topsoil to the site, the Contractor shall provide to the Landscape Architect the name and location of the topsoil source, along with the certified soil analysis of the topsoil to be used. The analysis shall verify that the proposed topsoil meets the topsoil specifications, and is capable of supporting healthy plant growth.
9.

After imported top soil has been delivered to the site, a second soils test may be required to verify that it is indeed the same soil as previously tested and designated for use in this project. No substitution of top soil shall be allowed without prior written authorization from the Landscape Architect.

10.

All plants used for this project shall conform to the following:

A. Any inspection certificates required by law shall accompany each delivery of plants and such certificate shall be filed with the Landscape Architect. All plants shall be subject to inspection and approval at the place of growth or upon delivery to the site for their quality, size, species, and variety. Such approval shall not impair the right of inspection and rejection at the site or during progress of work for size and condition of the plants, latent defects, or injuries. Any and all rejected plants shall be removed immediately from the premises by the Contractor. The Contractor shall make all replacements at his expense should he fail to comply in full with any of the specifications. Necessary replacements will be made as soon as weather conditions permit and all such plants replaced shall conform to all specifications herein.

B. Plants shall be fresh and vigorous, of normal habit and growth, and free of disease, insects and insect eggs and insect larvae, weeds and weed seed. No heeled-in plants from cold storage shall be accepted except on approval by the Landscape Architect prior to installation.

11.

All plants shall be installed using the following procedures:

A. Plants shall be generally located as indicated by the drawing. The Contractor shall stake out the location of all plants and planting areas, and no excavation or installation shall commence until such locations have been approved by the Landscape Architect.

B. All trees and shrubs shall be planted in pits as detailed in the planting details contained herein or as noted on the drawings. Tree and shrub pits shall be circular in outline, with a diameter at least two (2) times the diameter of the rootball of each plant to be installed. They shall be one to two and one half (1 – 2 ½) inches shallower than the rootball depth. When the plant is properly placed in the plant pit, the root collar shall be at or approximately one (1) inch above finished grade. The sides of the plant pit shall be roughened, and not smooth or sculpted.

C. Plant backfill mix shall be one hundred (100) percent native site soil.

D. For container grown plants, remove the container and place the plant vertically in the plant pit, directly on undisturbed soil. The root crown or collar shall be at or approximately one (1) inch above the finished grade. Perennial plants and ornamental grasses shall be planted with root collar at finished grade.

E. For balled and burlapped plants, place the plant vertically in the center of the pit, with the rootball resting on undisturbed soil. Cut and remove the wire basket and burlap or other wrapping material from the rootball. This may be done with the rootball in the pit. Any burlap or wire pieces underneath the rootball may be left in place if they cannot be removed. Do not fold the burlap over, but cut away as much as possible without disturbing the rootball. No burlap shall be pulled from under the rootball. Backfill the bottom one third (1/3) of the pit as the wire and burlap are removed. In all cases, maintain the integrity of the rootball.

F. Specified backfill material shall be carefully and firmly worked and tamped under and around the rootball to fill all voids. When backfilled and compacted to two thirds (2/3) the depth of the pit, thoroughly water with a hose to completely soak the roots and remove any air pockets.

G. The plant pit shall then be completely backfilled with the specified backfill mix and tamped well. A shallow watering basin or rain cup shall be formed around each plant. This basin will be equal in diameter to that of the original planting pit.

H. After planting, the following operations shall be performed:

I. Stake and mulch all trees per installation details.

II. Remove all nursery stakes ties, and tags from all plants. Prune and remove any dead, damaged, or broken branches. Maintain side growth on all trees.

12.

Staking shall be performed as follows:

A. Two (2) 2"x 2" square or 2" diameter round wood stakes, minimum ten (10) feet in length, shall be used to support each tree planted under this contract unless otherwise indicated. Metal t-posts shall not be used.

B. Tree ties shall conform to the staking detail shown on the planting detail sheet. Wire and vinyl hose shall not be used.

C. Each stake shall be located adjacent to the rootball, on opposing sides, to provide maximum support to the trunk. Do not penetrate the rootball with the stake.

D. The stakes shall be driven into the pit bottom after the tree has been placed in the pit, but before backfilling begins so as to avoid damage to the roots.

E. Stakes and ties shall be removed after one (1) full growing season from the time the tree was installed.

13.

All plants shall be thoroughly watered immediately after planting. This shall mean full and thorough saturation of all backfill in the pits and beds during the same day of planting. Water shall be applied only by open end hose with auto shut-off nozzle at very low pressure to avoid air pockets, injury to the plant, or washing away of backfill. When installed, watered, and fully settled, the plants shall be vertical. Subsequent watering shall be provided by the site's irrigation system. The Contractor shall insure that all plants, especially trees, receive sufficient water to maintain healthy growth and vigor. Over-watering shall be avoided, and prolonged saturation of the soil around the trees shall be eliminated by appropriately controlling the irrigation circuit which provides water to that area.

14.

Mulch (see plant materials schedule and specifications for size requirements) shall be placed to a depth of three (3) inches on top of the topsoil in all planting beds and over tree planting pits. The finished grade of the mulch shall be as follows:

A. Two (2) inches below the surface or finished grade of any paving, mowstrips, or walks adjacent to the planting area.

B. One (1) inch below top of metal edging.

C. At adjacent finished grade of the turf surrounding tree planting pits.

D. In tree pits, the mulch shall be kept six (6) inches away from the base of the tree.

E. Just prior to placement of the mulch, the Contractor shall treat the mulched areas with a pre-emergent herbicide according to the manufacturer's recommendations.

15.

Throughout the course of planting, excess and waste materials as well as excavated subsoil shall be continuously and promptly removed. All areas shall be kept clear and
- all reasonable precautions taken to avoid damage to existing structures, plants, and grass. When planting has been completed in an area, it shall be thoroughly cleaned of all debris, rubbish, subsoil, and waste materials. These shall be removed from the property and disposed of legally. All planting tools shall also be put away.

16.

Substantial Completion shall be defined as the complete installation of all plant materials, staking, mulching, and other work on the project in its entirety. Substantial completion shall not be given on designated portions of a project.

A. At substantial completion of all planting work outlined in these plans, the Contractor shall contact the Landscape Architect to arrange for a walk through to verify that all aspects of the work have been completed. Work must be fully completed (except for final clean-up) according to all plans, notes, and specifications and exhibit professional workmanship.

B. Notice by the Contractor shall be given, in writing, at least three (3) days in advance to the Owner's Representative and Landscape Architect so that proper scheduling can be made for those who are to attend.

C. At the appointed time, an inspection of all plant materials, including staking and mulching, shall be made.

D. A list of uncompleted items (punch list) shall be generated by the Landscape Architect and distributed to the Contractor and other involved parties within three (3) days of the substantial completion inspection. Each item on the punch list shall be corrected before the project will be approved and accepted by the Owner's representative. The Contractor will be back charged for time spent by the Owner and any consultants who have been brought to the site for a final inspection when the project is not ready for said inspection.

17.

The maintenance/establishment period shall begin one (1) day after the substantial completion inspection. The Contractor shall complete all punch list items during this period, as well as maintain and operate the entire irrigation system. The Contractor shall maintain all plantings until they are fully established. No weeds shall be allowed in the planting areas. This shall be a minimum period of sixty (60) days. If winter weather interrupts the maintenance period, the maintenance period shall be suspended and the balance of the time shall be carried over to the next growing season and completed then. The Owner and Contractor shall mutually determine when the maintenance period is suspended and when it starts up again. The maintenance work required shall include but not be limited to the following:

A. Appropriate watering of all plant materials.

B. Weeding and removal of all weeds from groundcover and planting areas.

C. Replacement of any dead, dying, or damaged trees, shrubs, perennials, or groundcover.

D. Filling and replanting of any low areas which may cause standing water.

E. Adjusting drip lines as required.

F. Filling and re-compaction of eroded areas, along with any required re-seeding and/or replanting.

18.

A final inspection shall be held prior to the end of the maintenance period to insure that all punch list items have been completed and the entire project is ready for acceptance by the Owner. Upon satisfaction that the Contractor has completed all punch list items, the irrigation system is fully and completely functional, and the required As-Built drawings, mylars and maintenance manuals have been submitted, the Owner shall accept the project. An official letter of final acceptance shall be prepared and issued to the Contractor, Landscape Architect, and the Owner's representative. Upon final acceptance of the project by the Owner's representative, the Owner shall assume full responsibility for the project, and the guarantee period shall begin.

19.

Upon final acceptance of the project as being properly installed, the Contractor shall guarantee the plant materials as follows:

A. All shrubs and groundcovers shall be guaranteed by the Contractor as to growth and health for a period of sixty (60) days after completion of the maintenance period and final acceptance.

B. All trees shall be guaranteed by the Contractor to live and grow in an acceptable upright position for a period of one (1) year after completion of the maintenance period and final acceptance.

20.

The Contractor shall, within fifteen (15) days after receiving written notification by Owner's representative, remove and replace all guaranteed plant materials which die or become unhealthy or appear to be in a badly impaired condition at any time during the guarantee period. Any plants that settle below or rise above the desired finished grade shall also be reset to the proper grade.

A. All replacements shall be plants of the same kind, size, and quality as originally specified in the "plant list" and they shall be furnished, planted, staked, and maintained as specified herein at no additional cost.

B. The Contractor will not be responsible for plants destroyed or lost due to occupancy of the project, vandalism on the part of others, or improper maintenance or lack thereof.
- 

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8/11/2022

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REVISION

NO.	AGENCY REVIEW	DESCRIPTION	DATE
1			MM/JUN/08/10/22

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

PLANTING NOTES

FILE: 21-18-022-100_LP-101X

JUB PROJ. #: 21-18-022

DRAWN BY: WRH

DESIGN BY: LTS

CHECKED BY: MLJ

AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

LAST UPDATED: 8/11/2022

SHEET NUMBER:
LP-001

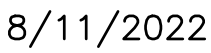
Page 1298 of 1426
Page 1361

Plot Date: 8/11/2022 11:21 AM Plotted By: Andrew Noorlander
Date Created: 8/10/2022 \\CDAFILES\PUBLIC\PROJECTS\JUL21-18-022 - MOSCOW BOOSTER STATION PROJECT\21-18-022-100 | P-101 X DWG

Page 1362

Page 1362

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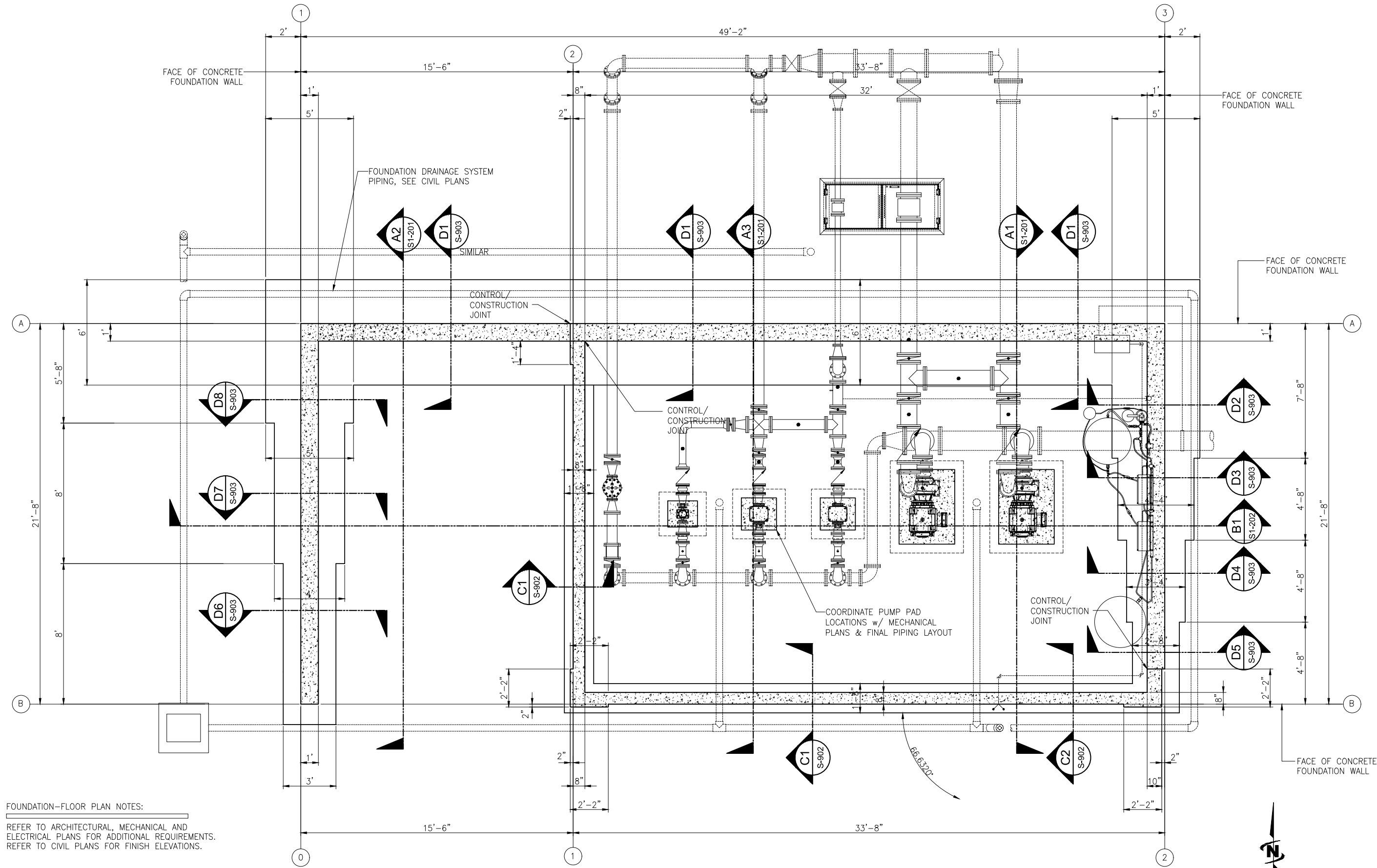
PLANTING SCHEDULE

ONE INCH
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY

LP-002

Plot Date: 9/10/2022 4:40 PM Plotted By: Rami Sappone
Date Created: 8/4/2022 NCATFILES\PUBLIC\PROJECTS\JUB\21-18-022 - MOSCOW BOOSTER PHASE II\21-18-022 - CAD\Sheet\BOOSTER STATION PROJECT\21-18-022-100 S-101X.DWG

P1 FOUNDATION PLAN
SCALE: 3/8"=1'-0"



FOUNDATION-FLOOR PLAN NOTES:
REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL PLANS FOR ADDITIONAL REQUIREMENTS.
REFER TO CIVIL PLANS FOR FINISH ELEVATIONS.



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SIGNED BY: DAVID
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5725
DATE ORIGINAL
SIGNED: 08/12/2022
LEWIS BARNETT

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NO.	REVISION	DESCRIPTION	DATE

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW
STRUCTURAL (S)
INDIAN HILLS BOOSTER PUMP STATION
FOUNDATION PLAN

FILE: 21-18-022-100_S-101X
JUB PROJ. #: 21-18-022
DRAWN BY: DLB
DESIGN BY: DLB
CHECKED BY: RSM
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/4/2022

SHEET NUMBER:

S1-101

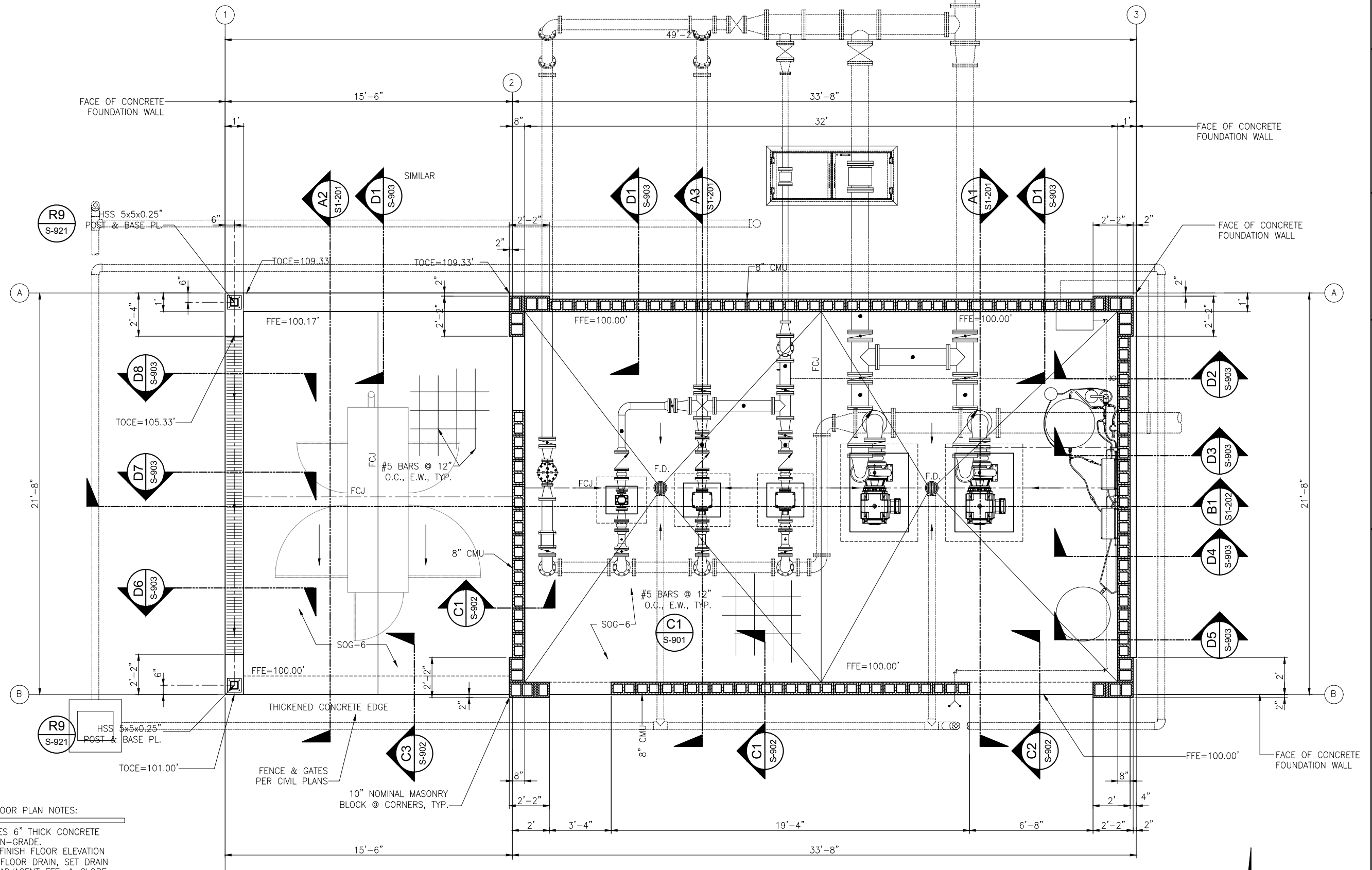


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Plot Date: 9/10/2022 4:40 PM Plotted By: Rami Sappapota
Date Created: 8/4/2022 NCADFILES\PUBLIC\PROJECTS\JUB21-18-022 - MOSCOW BOOSTER STATION PHASE II\21-18-022-100 S-101X.DWG

FOUNDATION-FLOOR PLAN NOTES:
SOG-6 INDICATES 6" THICK CONCRETE
SLAB-ON-GRADE.
FFE INDICATES FINISH FLOOR ELEVATION
F.D. INDICATES FLOOR DRAIN, SET DRAIN
1" BELOW ADJACENT FFE, & SLOPE
UNIFORMLY TO DRAIN, TYPICAL.
CMU INDICATES CONCRETE MASONRY UNITS
— INDICATES DIRECTION OF SLOPE DOWN
FCJ INDICATES FLOOR CONTROL JOINT.
TOCE INDICATES TOP OF CONCRETE ELEVATION

P2 FLOOR PLAN
SCALE: 3/8"=1'-0"



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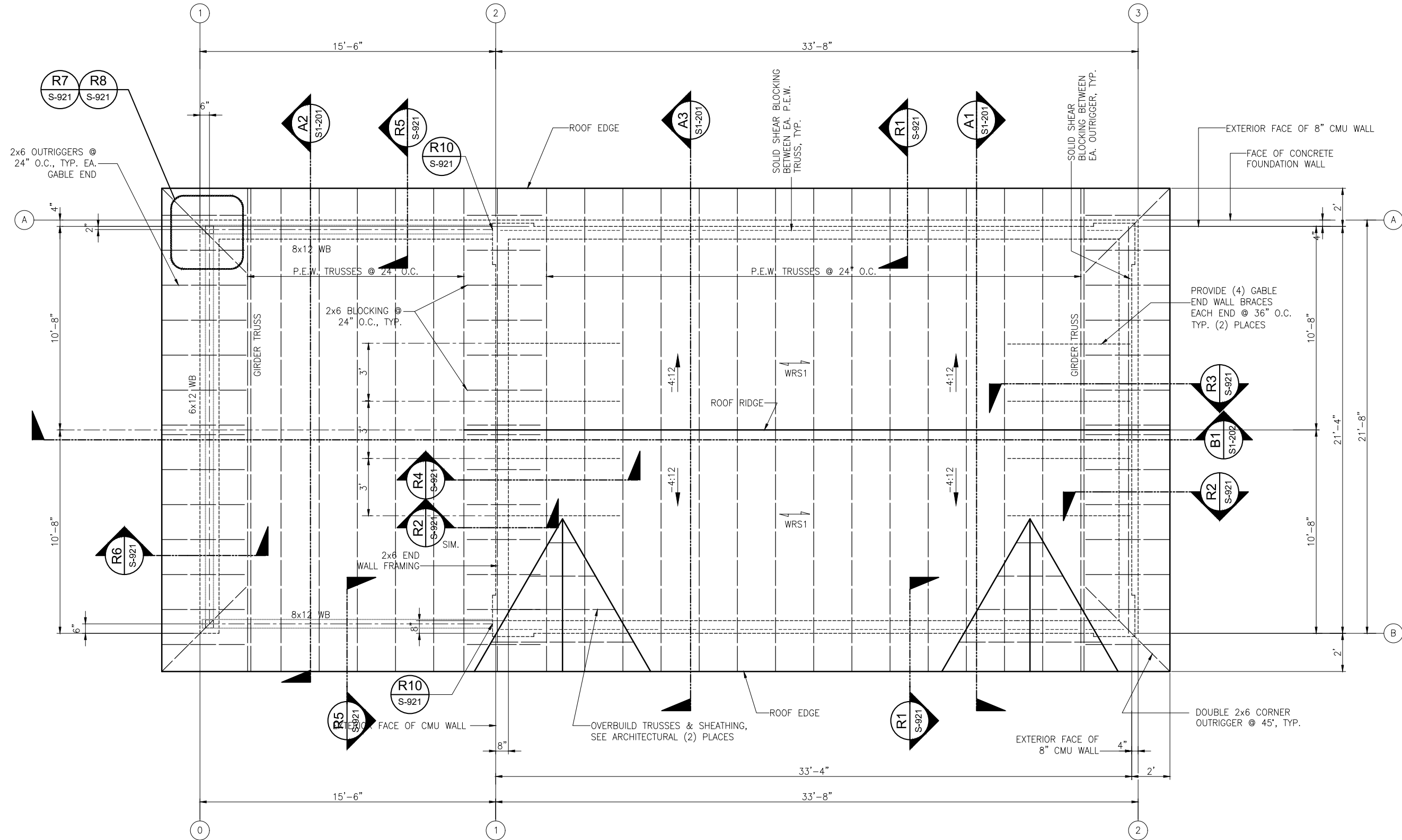
BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW
STRUCTURAL (S)
INDIAN HILLS BOOSTER PUMP STATION
FLOOR PLAN

FILE: 21-18-022-100_S-101X
JUB PROJ. #: 21-18-022
DRAWN BY: DLB
DESIGN BY: DLB
CHECKED BY: RSM
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/4/2022

SHEET NUMBER:
S1-102

Plot Date: 9/10/2022 4:40 PM Plotted By: Ram Sappap
Date Created: 8/4/2022 10:41:53 AM Project: JUB21-18-022 - MOSCOW BOOSTER STATION PHASE II: 21-18-022 - CAD SHEET: BOOSTER STATION PROJECT: 21-18-022-100 S-101X.DWG

P3 ROOF FRAMING PLAN
SCALE: 3/8"=1'-0"



ROOF FRAMING NOTES:

WB INDICATES SOLID SAWN WOOD BEAM
WRS1 INDICATES 5/8" WOOD ROOF SHEATHING
— INDICATES DIRECTION OF SLOPE DOWN
P.E.W. INDICATES PRE-ENGINEERED WOOD CONSTRUCTION

REFER TO ARCHITECTURAL FOR ATTIC ACCESS LOCATIONS & DETAILS.



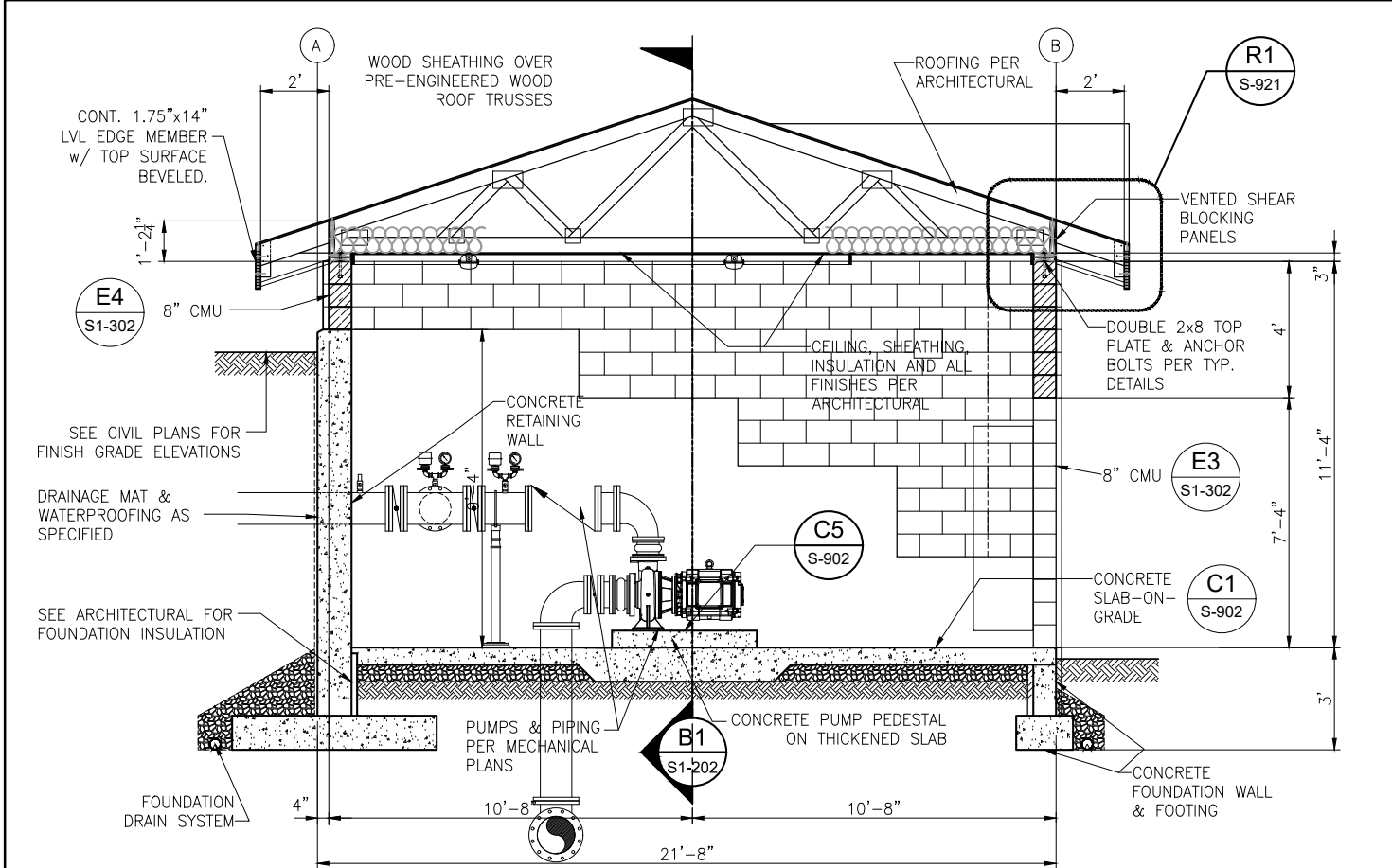
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NO.	DESCRIPTION	BY	DATE

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW
STRUCTURAL (S)
INDIAN HILLS BOOSTER PUMP STATION
ROOF FRAMING PLAN

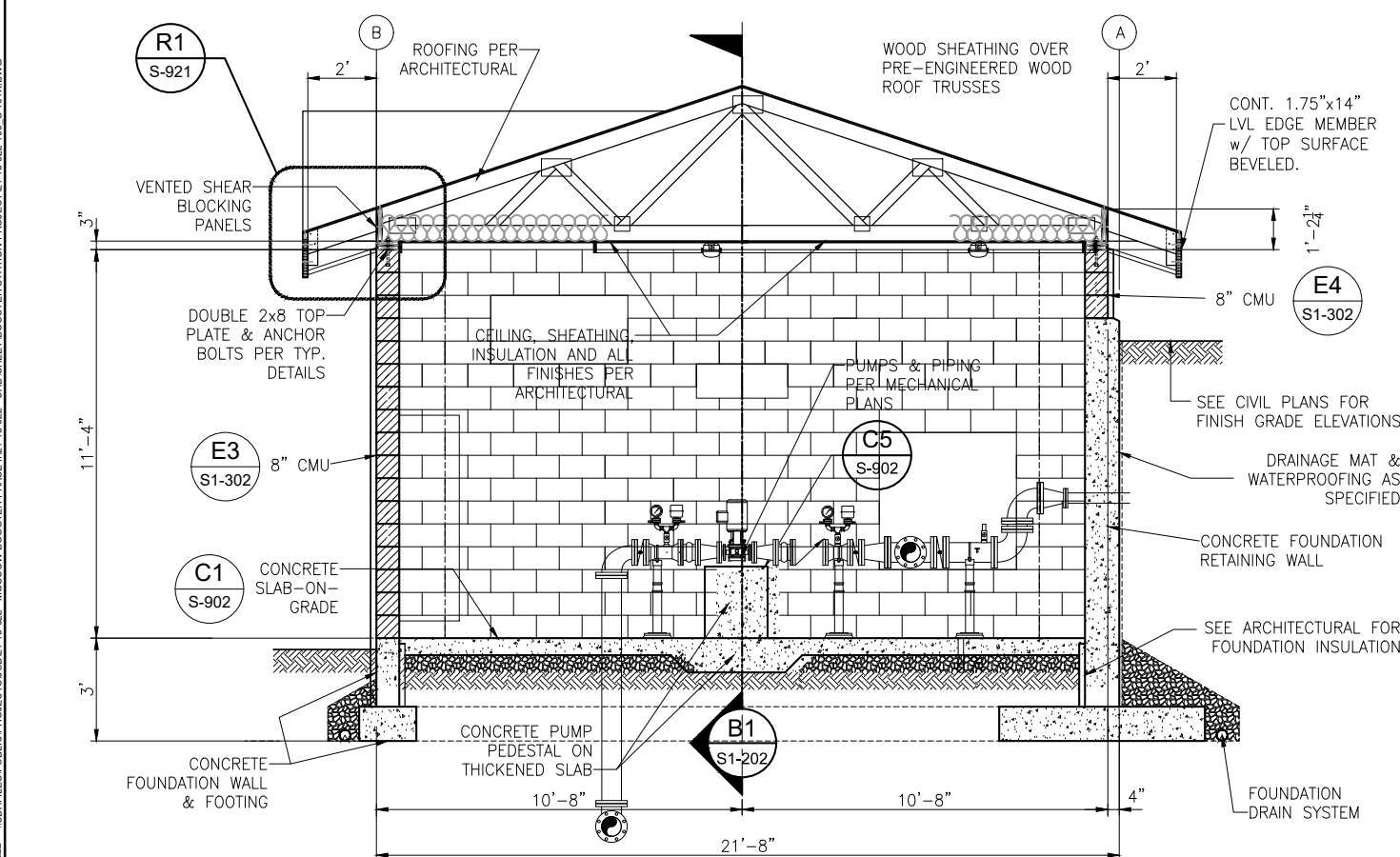
FILE: 21-18-022-100_S-101X
JUB PROJ. #: 21-18-022
DRAWN BY: DLB
DESIGN BY: DLB
CHECKED BY: RSM
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY
LAST UPDATED: 8/4/2022

SHEET NUMBER:
S1-103

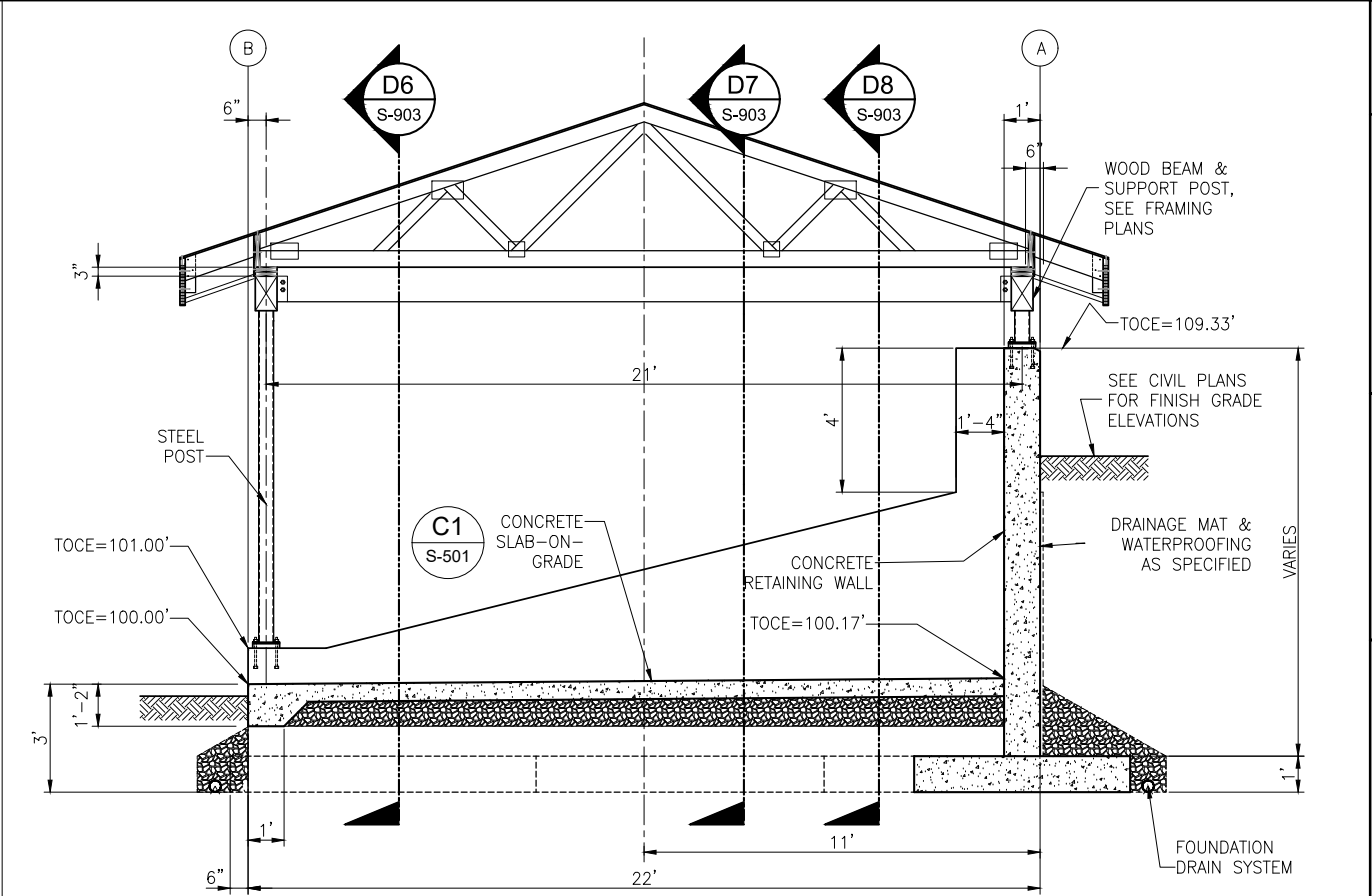
Plot Date: 9/10/2022 4:40 PM Plotted By: Ram Sappapota
Date Created: 8/4/2022 10:41:18 AM Project: JUB21-18-022 - MOSCOW BOOSTER PHASE II(21-18-022 - CAD SHEET) BOOSTER STATION PROJECT(21-18-022-100 S-101X.DWG



A1 TRANSVERSE BUILDING SECTION
SCALE: 3/8"=1'-0"



A3 TRANSVERSE BUILDING SECTION
SCALE: 3/8"=1'-0"



A2 TRANSVERSE BUILDING SECTION
SCALE: 3/8"=1'-0"



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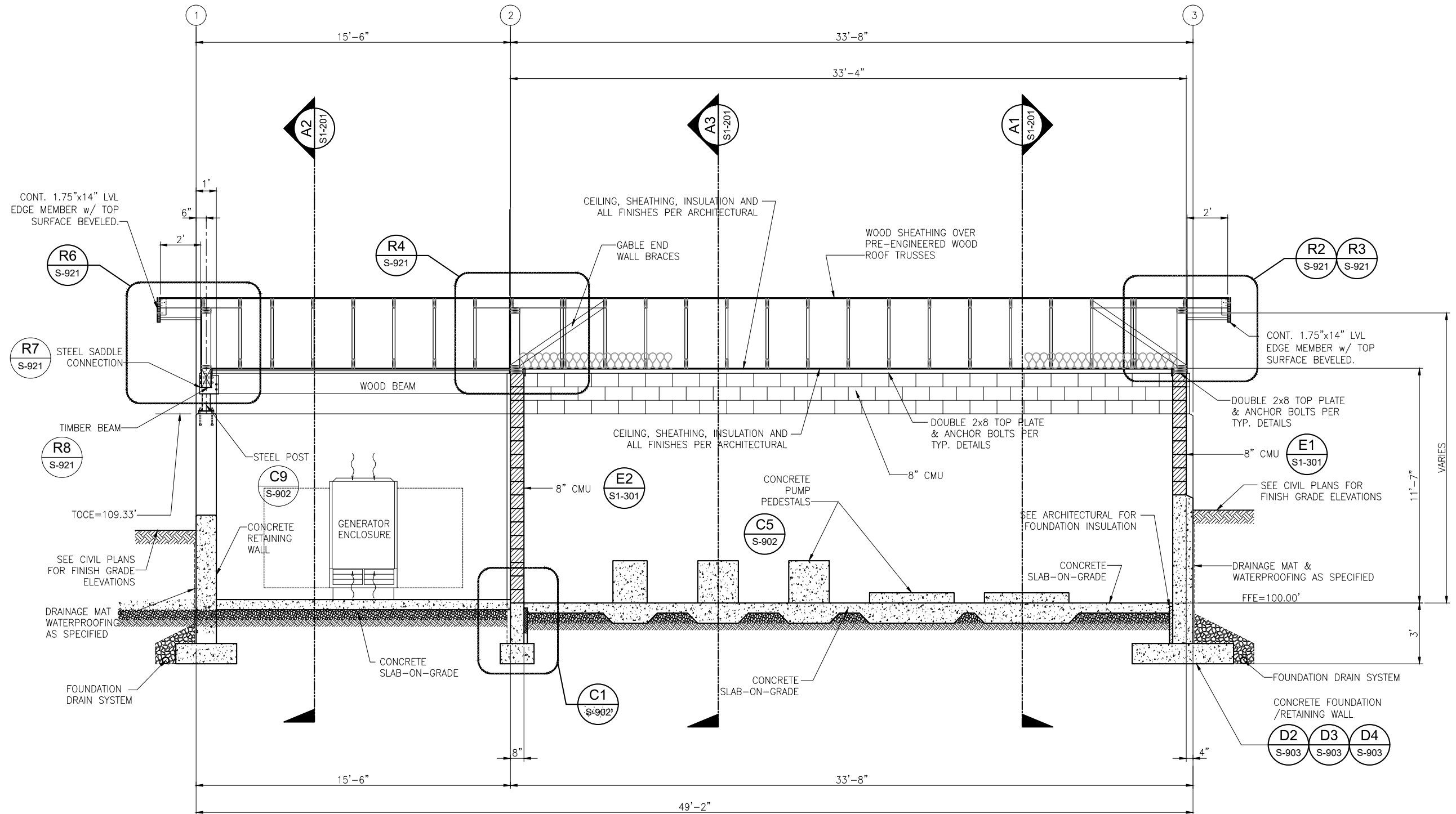
BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

STRUCTURAL (S)
INDIAN HILLS BOOSTER PUMP STATION
BUILDING SECTION VIEWS

FILE: 21-18-022-100_S-101X
JUB PROJ. #: 21-18-022
DRAWN BY: DLB
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SHEET NUMBER:
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SHEETS FOR ADDITIONAL REQUIREMENTS.
REFER TO ARCHITECTURAL FOR ATTIC ACCESS LOCATIONS & DETAILS.

B1 LONGITUDINAL BUILDING SECTION
SCALE: 3/8"=1'-0"

[illegible]

E1 EAST WALL ELEVATION VIEW (GRID 2)
SCALE: 3/8"=1'-0"

** COORDINATE HVAC WALL UNIT
MASONRY OPENING SIZES w/
EQUIPMENT SUBMITTALS

(2) #5 BARS IN SOLID GROUTED BOND BEAM, TYPICAL

10" CMU

8" CMU

10" CMU

ROOF SYSTEM, SEE ROOF FRAMING PLAN FOR STRUCTURAL AND ARCHITECTURAL FOR EVERYTHING ELSE

(2) #4 BARS IN SOLID GROUTED HORIZONTAL BOND BEAMS ABOVE & BELOW OPENINGS

(2) #4 BARS IN SOLID GROUTED HORIZONTAL BOND BEAMS

#5 VERTICAL BARS, CENTERED IN CORES, SPACED AS SHOWN, 32" O.C. MAXIMUM

CONCRETE FOUNDATION WALL & FOOTING

(2) #4 BARS IN SOLID GROUTED HORIZONTAL BOND BEAMS ABOVE & BELOW OPENINGS

#5 DOWELS TO MATCH LOCATION OF VERTICAL MASONRY WALL BARS, TYP.

Dimensions: 2'-8", 2'-8", 2'-8", 2'-8", 1'-4", 2'-8", 2', 2', 9'-4", 2', 1', 4', 2'-8", 21'-8"

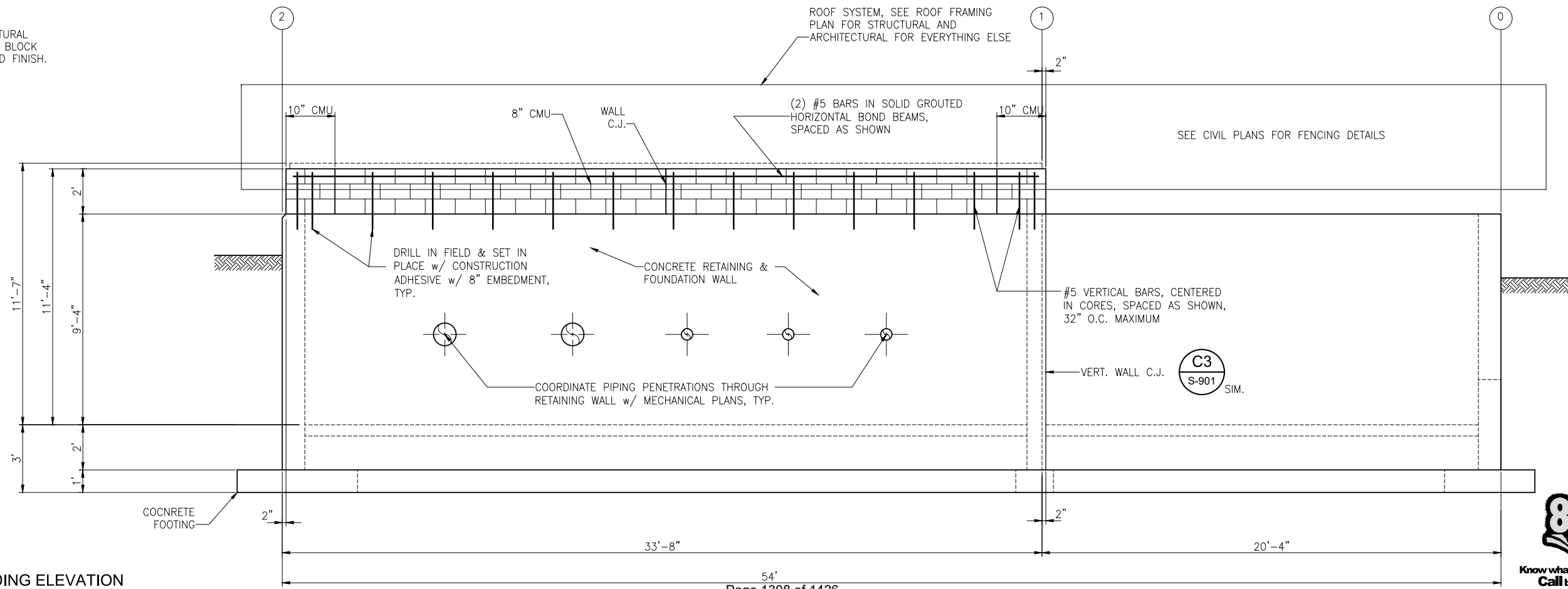
E2 WEST WALL ELEVATION VIEW (GRID 1)
SCALE: 3/8"=1'-0"



S1-301

[illegible]

NOTE:
REFER TO ARCHITECTURAL
DRAWINGS FOR CMU BLOCK
TEXTURE, COLOR AND FINISH.



E6 NORTH BUILDING ELEVATION
SCALE: 3/8"=1'-0"



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[illegible]

BOOSTER STATION REPLACEMENTS - PHASE II REBID

CITY OF MOSCOW

STRUCTURAL (S)
INDIAN HILLS BOOSTER PUMP STATION
BUILDING ELEVATION VIEWS

FILE : 21-18-022-100_S-101X
SUB PROJ. # : 21-18-022
DRAWN BY: DLB
DESIGN BY: DLB
CHECKED BY: RSM

AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/4/2022

SHEET NUMBER:

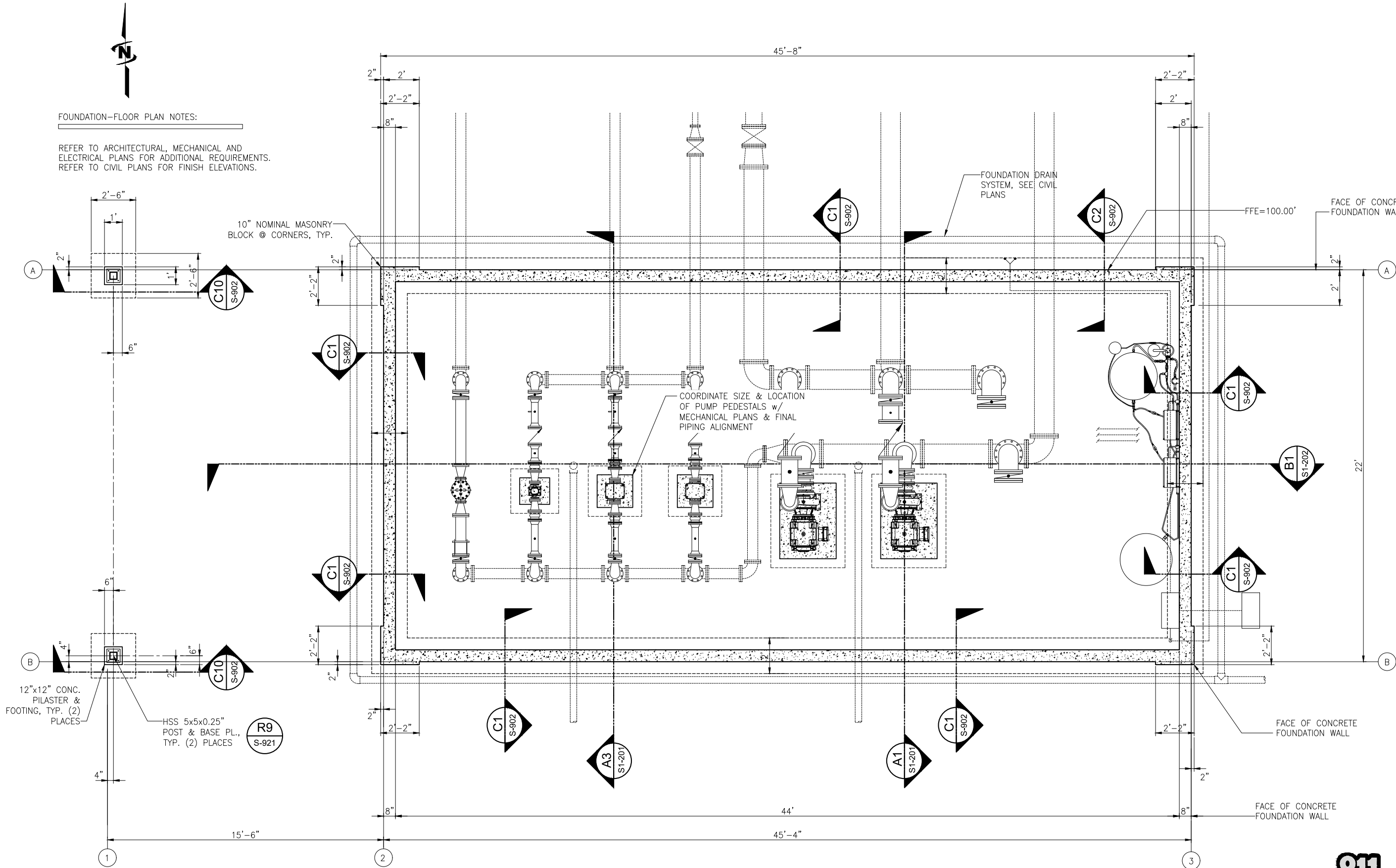
Discussion

S1-302



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Date Created: 8/4/2022 NCADFILES\PROJECTS\JUB\21-18-022 - MOSCOW BOOSTER STATION PHASE II\21-18-022 - CAD SHEET BOOSTER STATION PROJECT\21-18-022-100 S-101X.DWG



P1 FOUNDATION PLAN
SCALE: 3/8"=1'-0"



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NO.	REVISION	DESCRIPTION	DATE

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW
STRUCTURAL (S)
PONDEROSA BOOSTER PUMP STATION
FOUNDATION PLAN

FILE: 21-18-022-100_S-101X
JUB PROJ. #: 21-18-022
DRAWN BY: DLB
DESIGN BY: DLB
CHECKED BY: RSM
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/4/2022

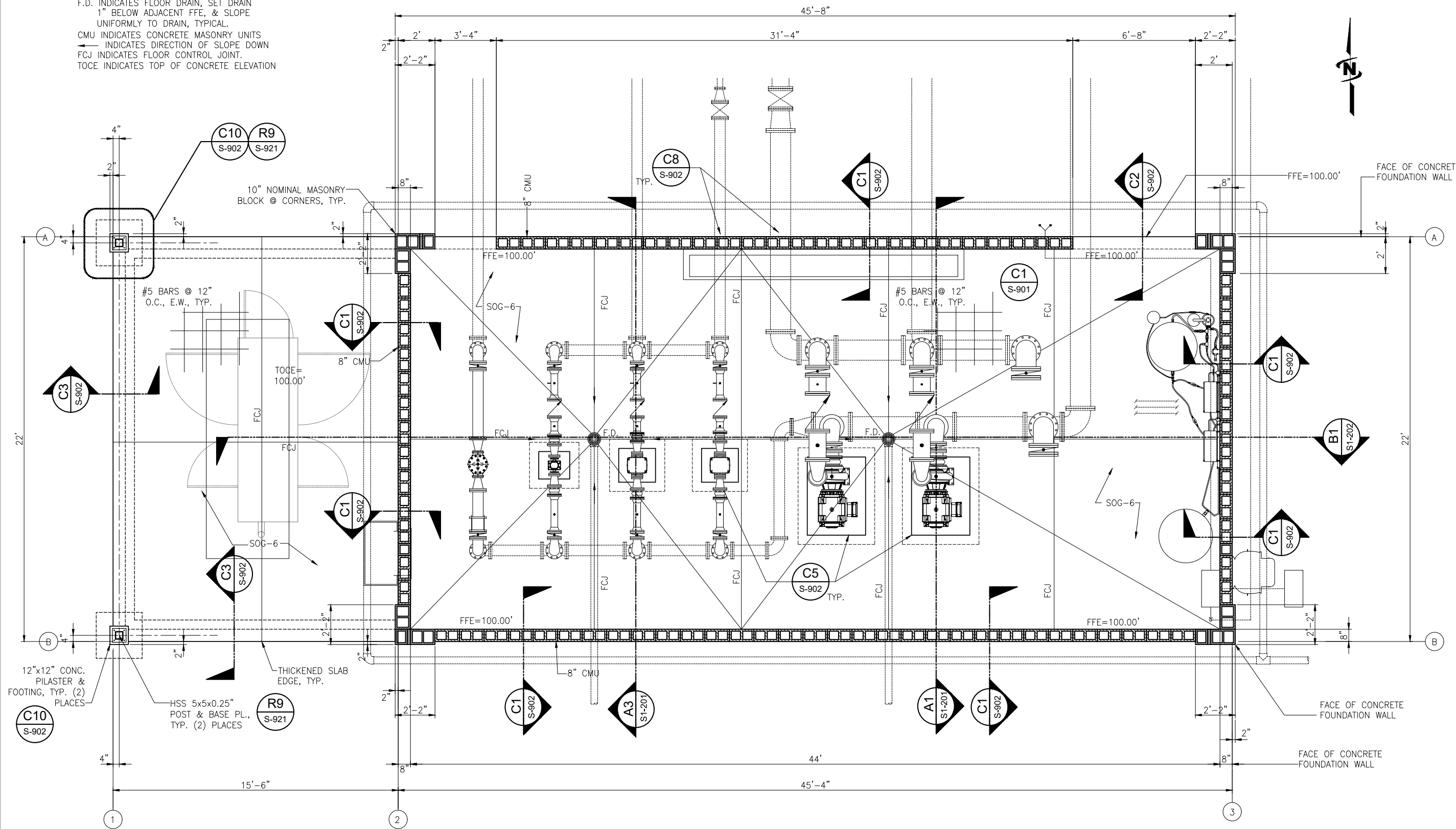
SHEET NUMBER:

S2-101

Plot Date: 9/10/2022 4:41 PM Plotted By: Rami Sappopo
Date Created: 8/4/2022 NCADFILES\PROJECTS\JUB21-18-022 - MOSCOW BOOSTER STATION PHASE II\21-18-022 - CAD SHEET BOOSTER STATION PROJECT\21-18-022-100 S-101X.DWG

FOUNDATION-FLOOR PLAN NOTES:

SOG-6 INDICATES 6" THICK CONCRETE
SLAB-ON-GRADE.
FFE INDICATES FINISH FLOOR ELEVATION
F.D. INDICATES FLOOR DRAIN, SET DRAIN
1" BELOW ADJACENT FFE, & SLOPE
UNIFORMLY TO DRAIN, TYPICAL.
CMU INDICATES CONCRETE MASONRY UNITS
INDICATES DIRECTION OF SLOPE DOWN
FCJ INDICATES FLOOR CONTROL JOINT.
TOCE INDICATES TOP OF CONCRETE ELEVATION



P2 FLOOR PLAN
SCALE: 3/8"=1'-0"



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Phone: 208.746.9010
www.jub.com

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SIGNED BY: DAVID
LEWIS BARNETT
5725
DATE ORIGINAL
SIGNED: 08/12/2022
LEWIS BARNETT

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NO.	REVISION	DESCRIPTION	DATE

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW
STRUCTURAL (S)
PONDEROSA BOOSTER PUMP STATION
FLOOR PLAN

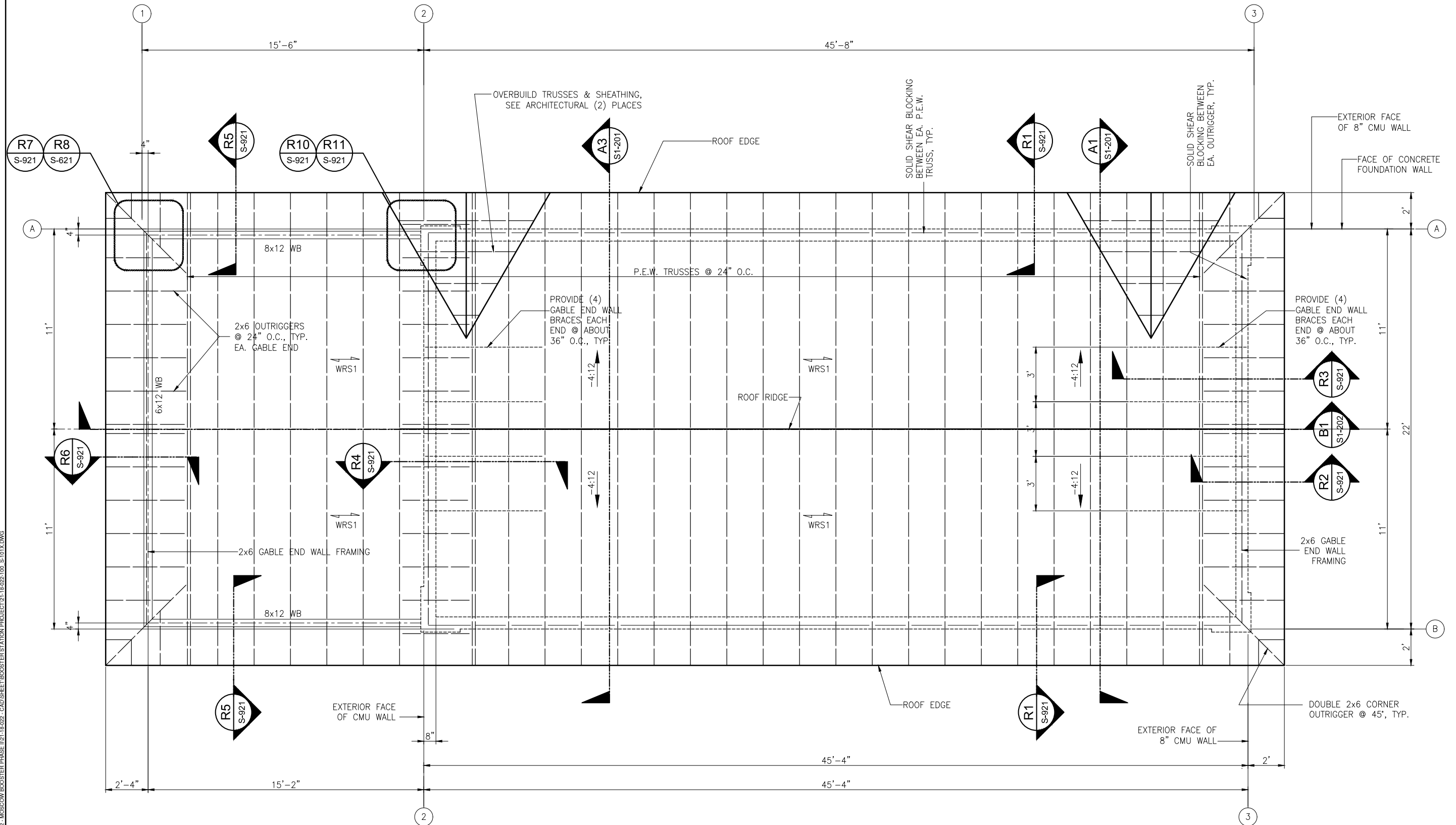
FILE: 21-18-022-100_S-101X
JUB PROJ. #: 21-18-022
DRAWN BY: DLB
DESIGN BY: DLB
CHECKED BY: RSM
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/4/2022

SHEET NUMBER:

S2-102



Know what's below.
Call before you dig.



ROOF FRAMING NOTES:

WRS1 INDICATES 5/8" WOOD ROOF SHEATHING
 ← INDICATES DIRECTION OF SLOPE DOWN
 P.E.W. INDICATES PRE-ENGINEERED WOOD
 CONSTRUCTION

REFER TO ARCHITECTURAL FOR ATTIC ACCESS LOCATIONS & DETAILS.



P3 ROOF FRAMING PLAN
SCALE: 3/8"=1'-0"

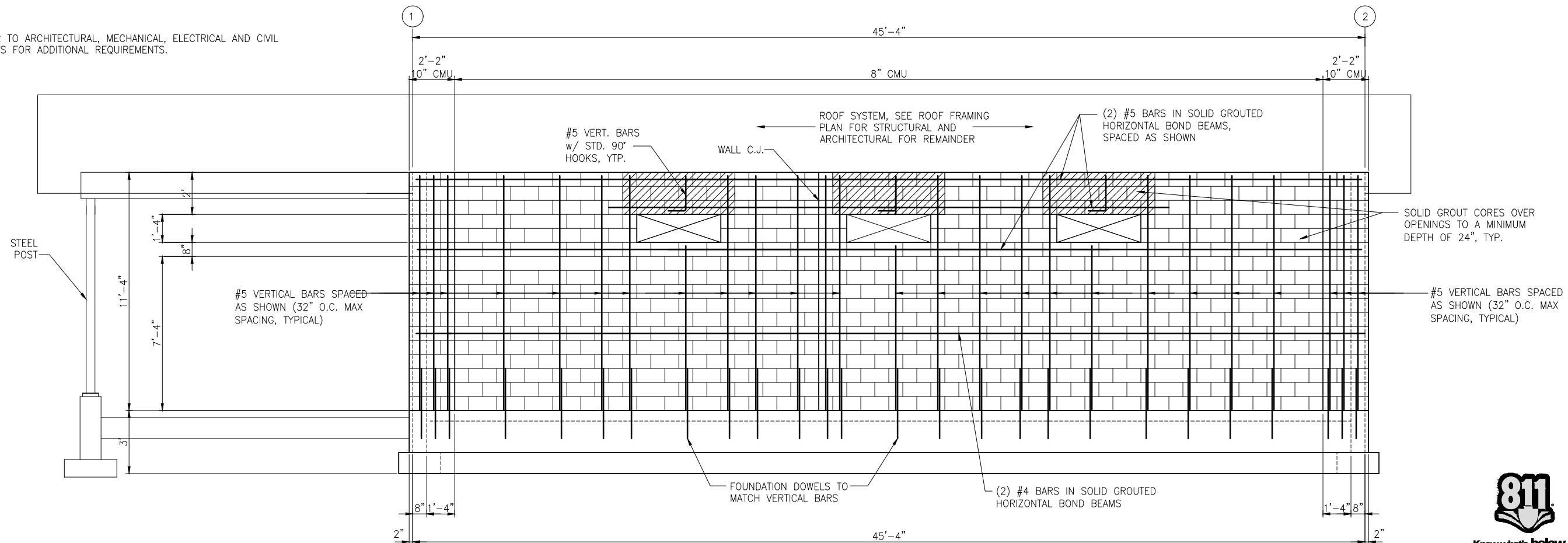


Plot Date: 9/10/2022 4:42 PM Plotted By: Rami Sappapota
Date Created: 8/4/2022 MODIFIED: PUBLIC PROJECTS, JUB02118-022 - MOSCOW BOOSTER PHASE II(2)18-022 - CAD SHEET BOOSTER STATION PROJECT(2)18-022-109 S-101X.DWG

A1 NOT USED
SCALE: 3/8"=1'-0"

B1 SOUTH WALL ELEVATION VIEW
SCALE: 3/8"=1'-0"

NOTE:
REFER TO ARCHITECTURAL, MECHANICAL, ELECTRICAL AND CIVIL
SHEETS FOR ADDITIONAL REQUIREMENTS.



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5725
DATE ORIGINAL
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REVISION		NO.	DESCRIPTION	BY	DATE

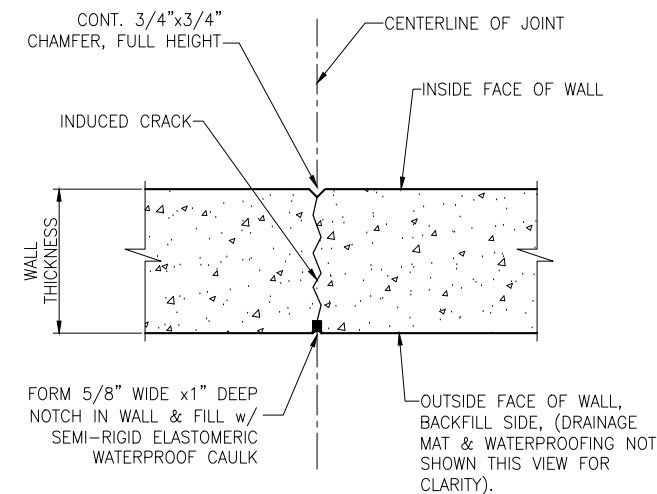
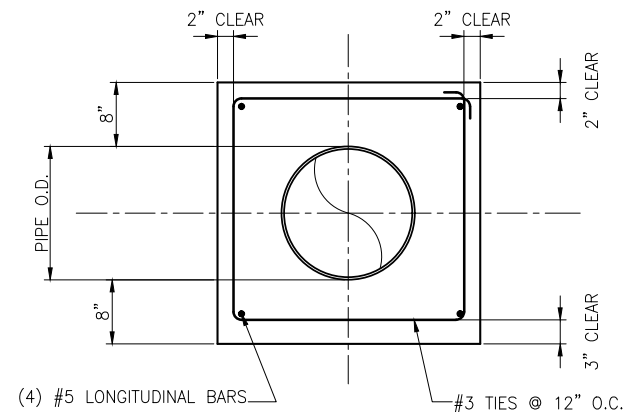
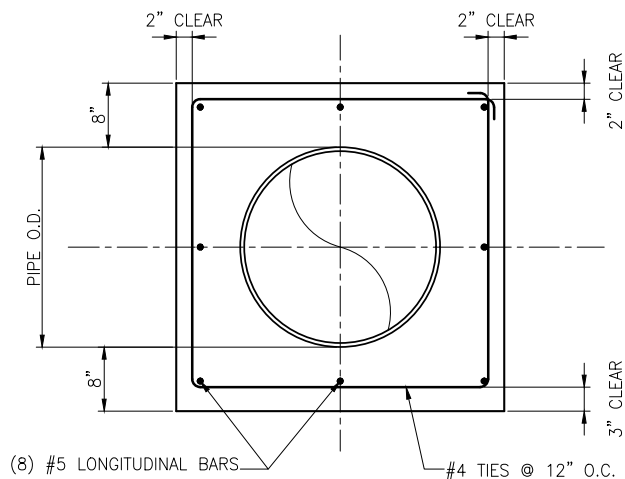
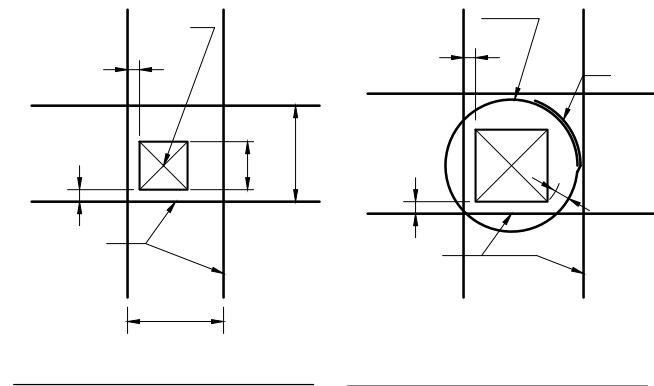
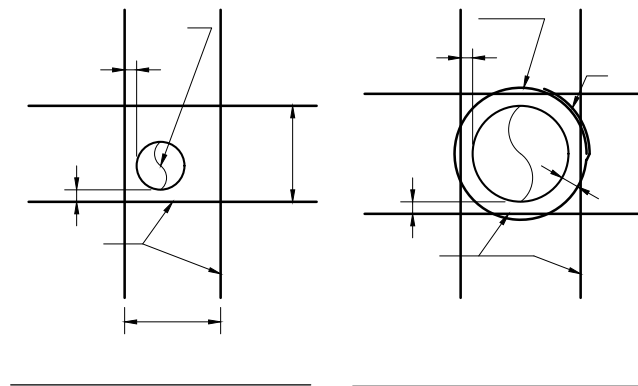
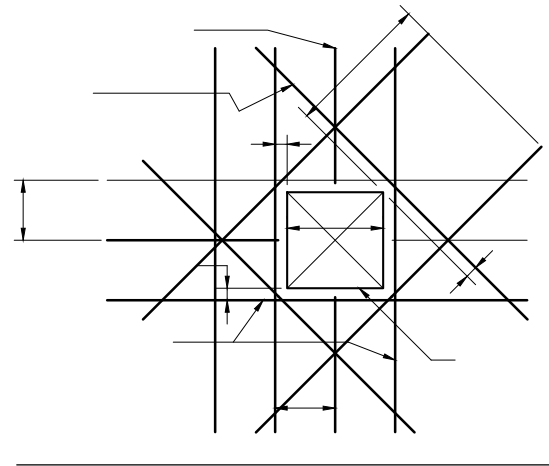
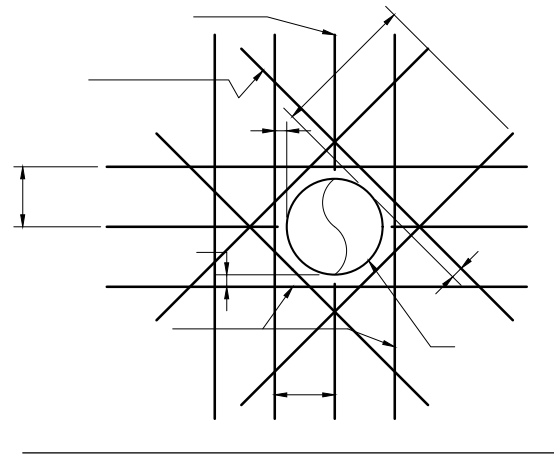
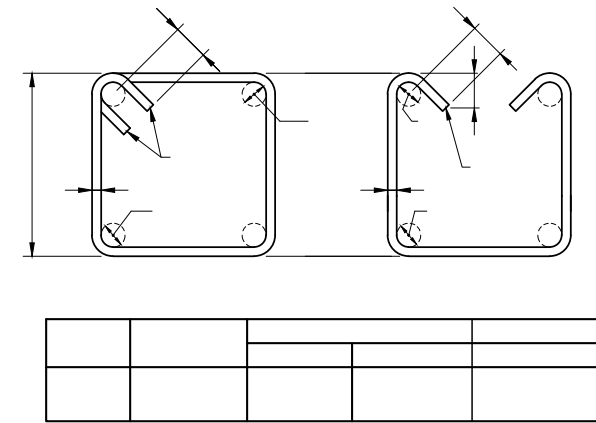
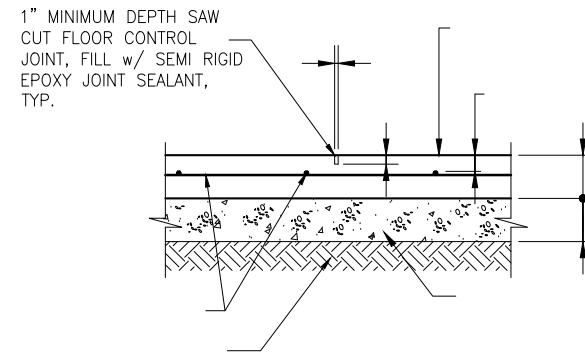
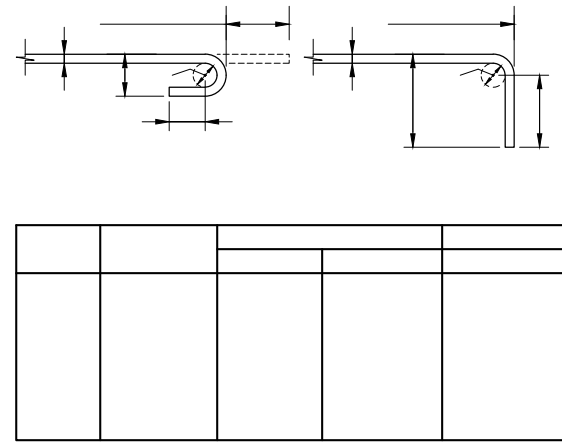
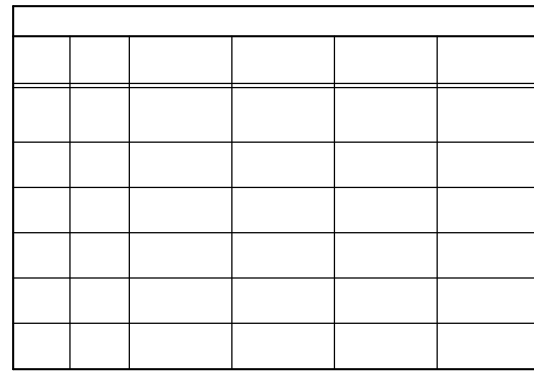
BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

STRUCTURAL (S)
PONDEROSA BOOSTER PUMP STATION
BUILDING ELEVATION VIEWS

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JUB PROJ. #: 21-18-022
DRAWN BY: DLB
DESIGN BY: DLB
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AT FULL SIZE, IF NOT ONE
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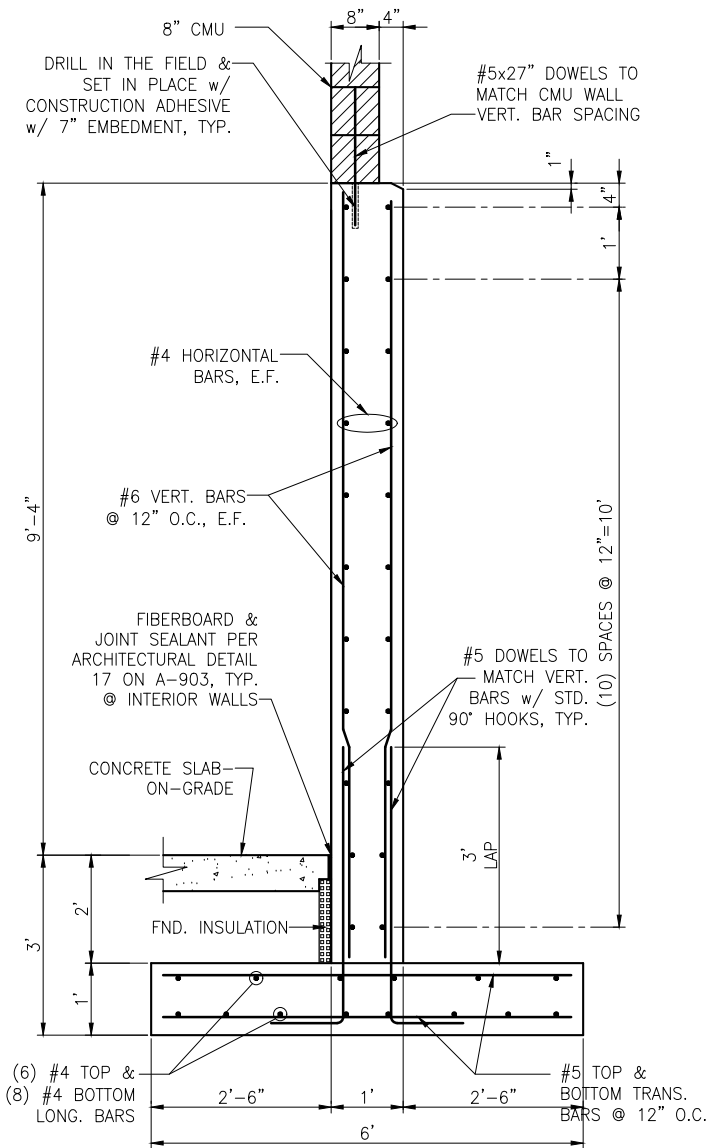
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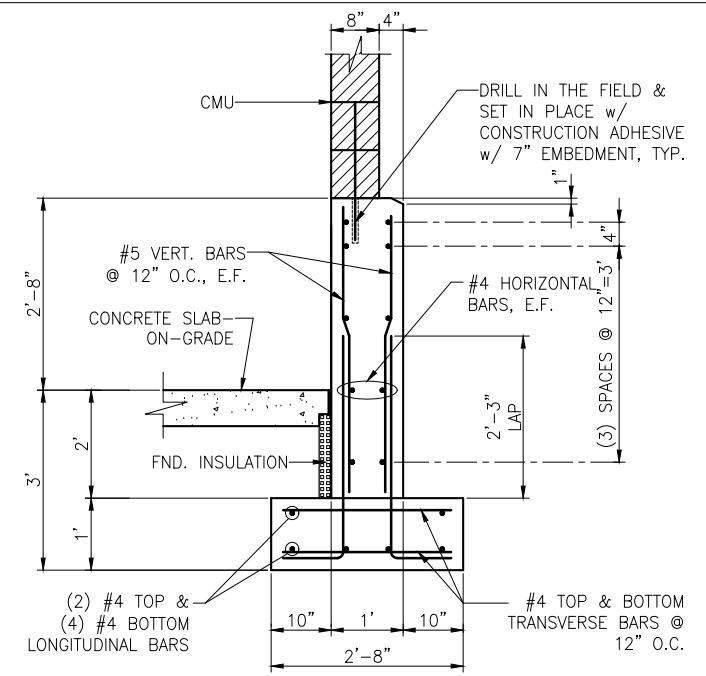


D3 NOT USED
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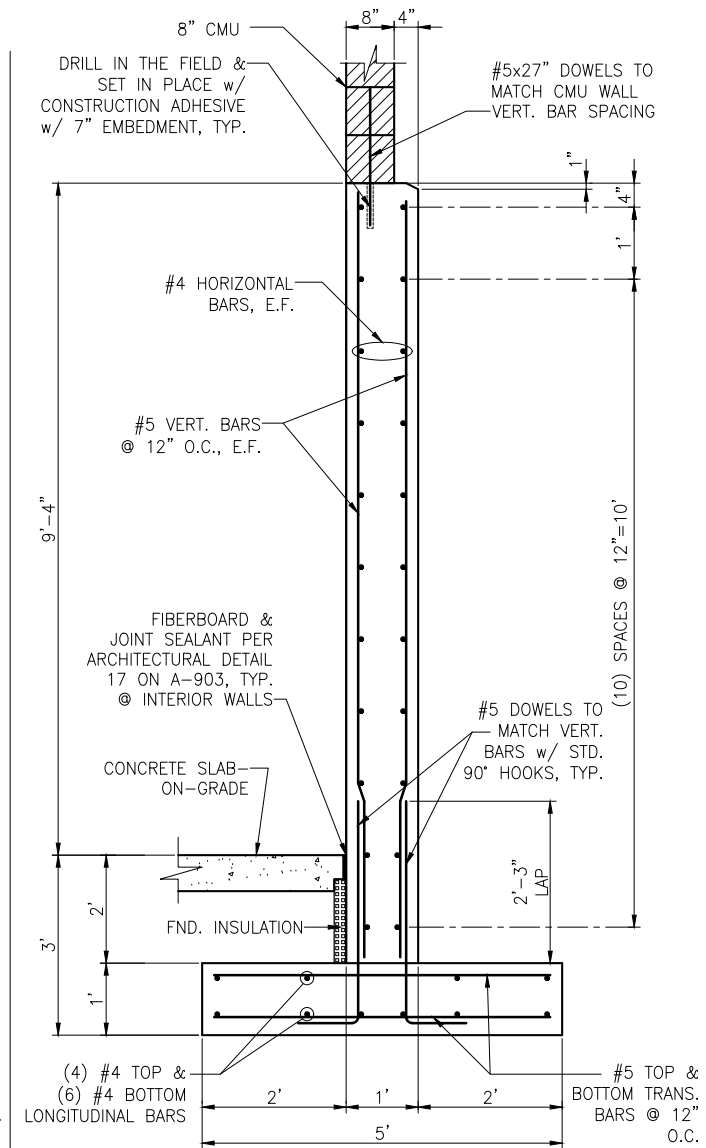
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Date Created: 8/4/2022 MCADFILES\PUBLIC\PROJECTS\JUB21-18-022-MOSCOW BOOSTER PHASE I\02-18-022-CAD\SHEET BOOSTER STATION PROJECT\21-18-022-100-S-101X.DWG



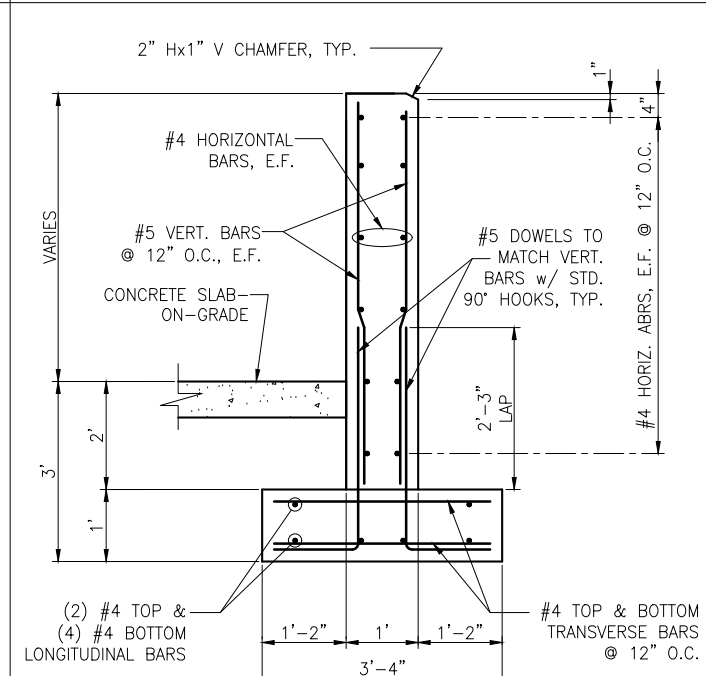
D1 TYP. FOUNDATION/RETAINING WALL SECTION
SCALE: 3/4"=1'-0"



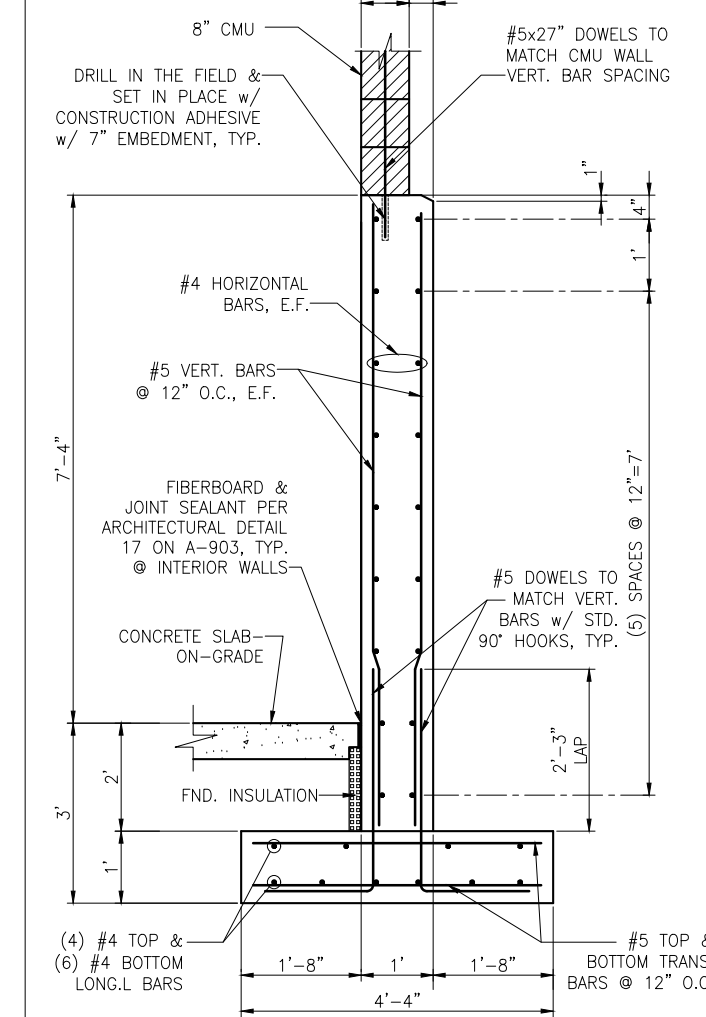
D5 TYP. FOUNDATION/RETAINING WALL SECTION
SCALE: 3/4"=1'-0"



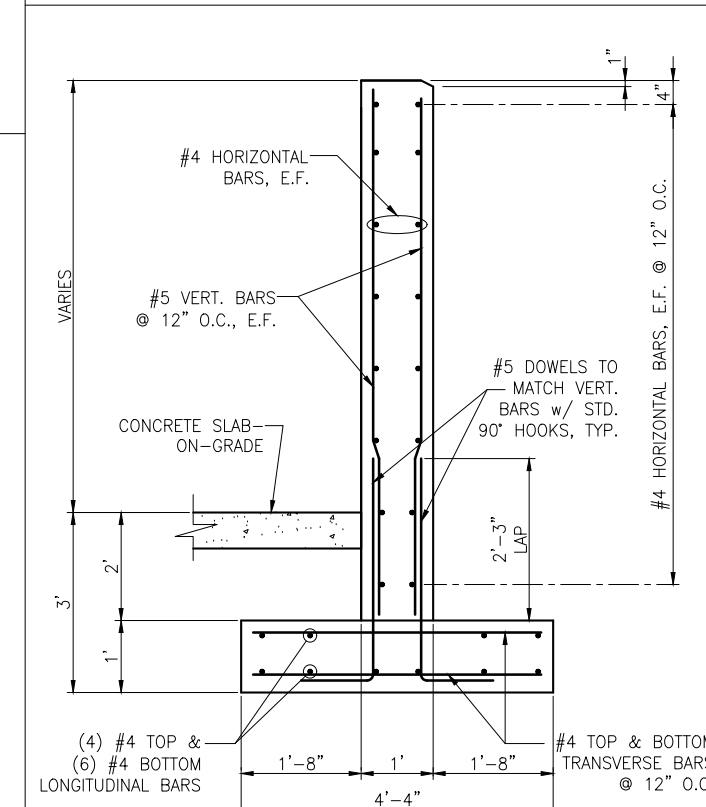
D2 TYP. FOUNDATION/RETAINING WALL SECTION
SCALE: 3/4"=1'-0"



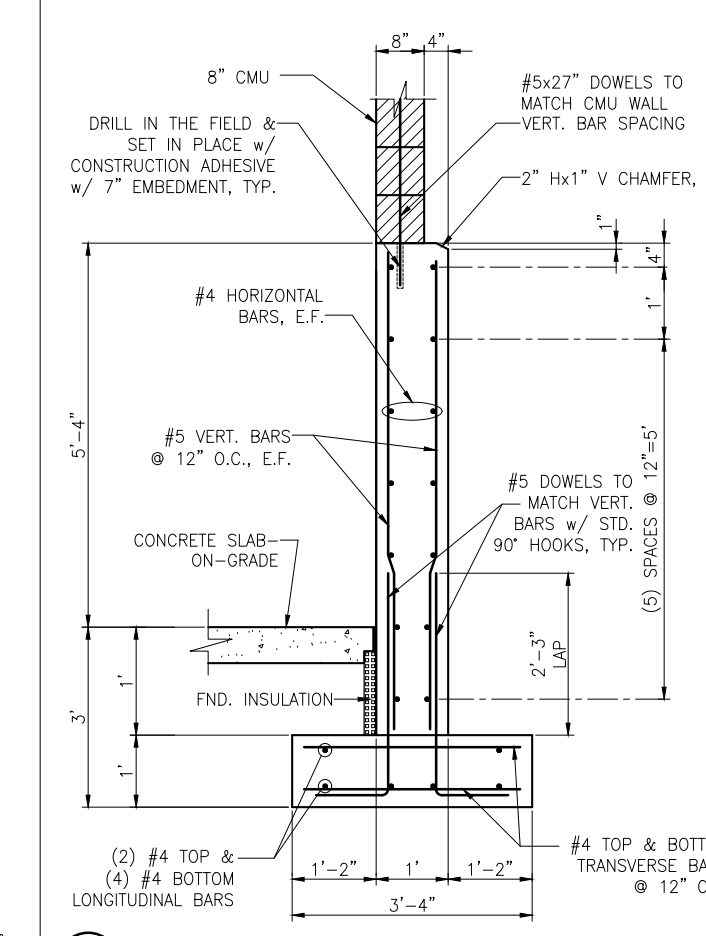
D6 TYP. FOUNDATION/RETAINING WALL SECTION
SCALE: 3/4"=1'-0"



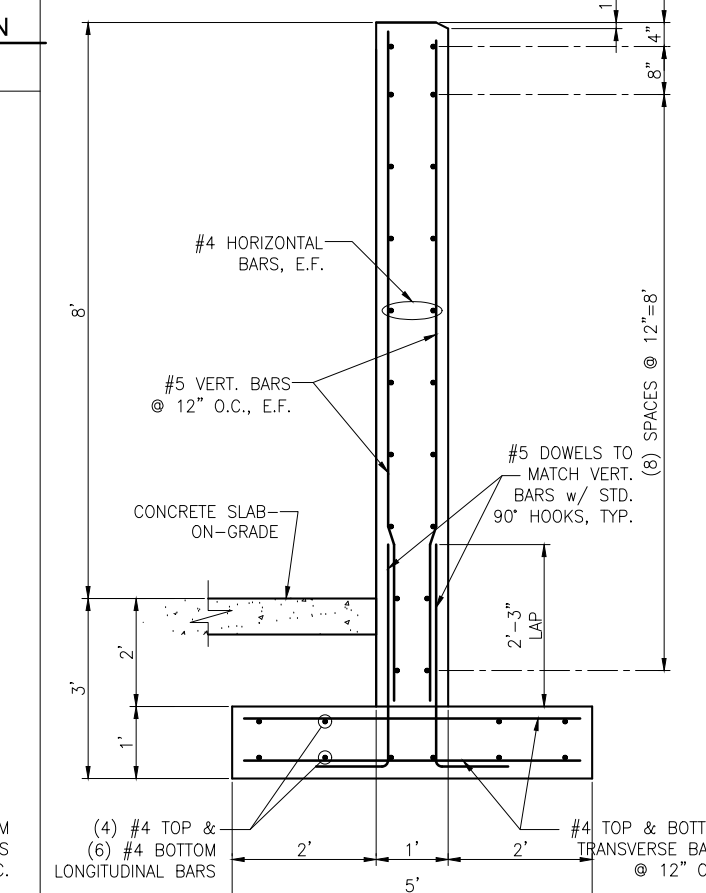
D3 TYP. FOUNDATION/RETAINING WALL SECTION
SCALE: 3/4"=1'-0"



D7 TYP. FOUNDATION/RETAINING WALL SECTION
SCALE: 3/4"=1'-0"



D4 TYP. FOUNDATION/RETAINING WALL SECTION
SCALE: 3/4"=1'-0"



D8 TYP. FOUNDATION/RETAINING WALL SECTION
SCALE: 3/4"=1'-0"

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5725
DATE ORIGINAL SIGNED: 08/12/2022

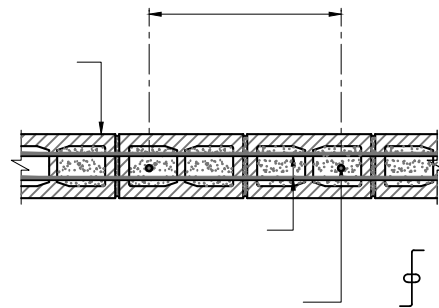
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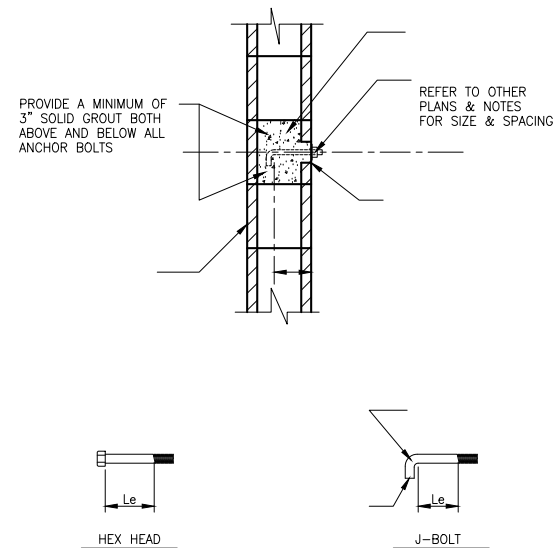
BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

STRUCTURAL (S)
BOTH PUMP STATIONS
TYPICAL REINFORCED CONCRETE DETAILS

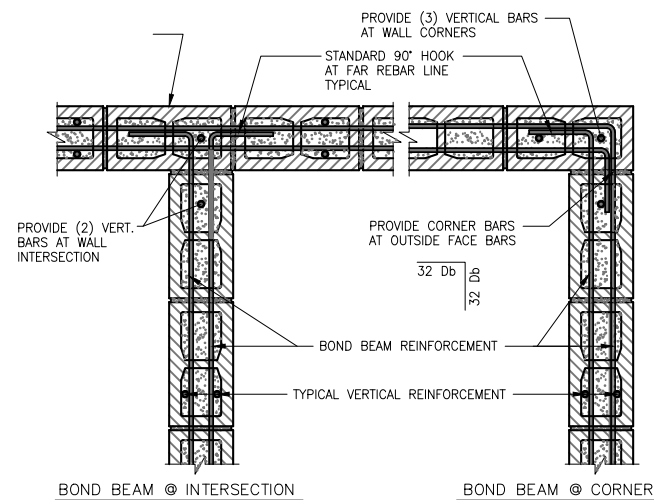
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JUB PROJ. #: 21-18-022
DRAWN BY: DLB
DESIGN BY: DLB
CHECKED BY: RSM
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/4/2022
SHEET NUMBER:
S-903



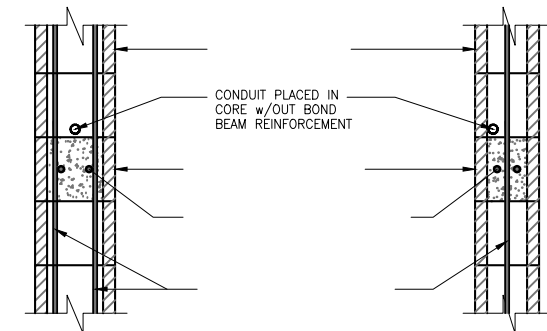
M1 TYP. CMU REBAR PLACEMENT (1) VERT BAR
SCALE: N.T.S.



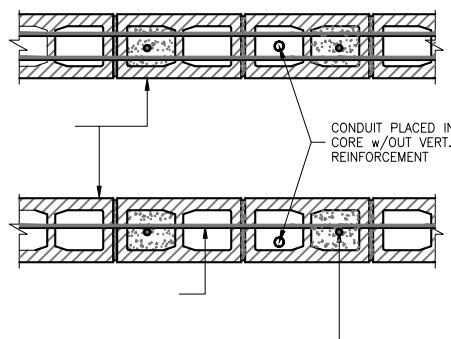
M2 TYP. MASONRY ANCHOR BOLT PLACEMENT
SCALE: N.T.S.



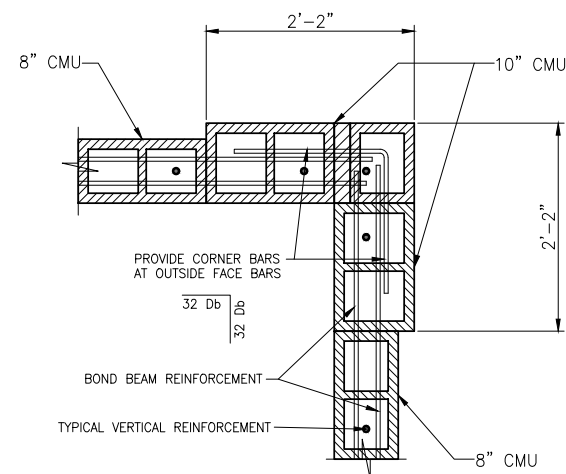
M3 **TYP. MASONRY WALL INTERSECTION DETAILS**
SCALE: N.T.S.



M4 TYP. CONDUIT PLACEMENT IN MASONRY
SCALE: N.T.S.



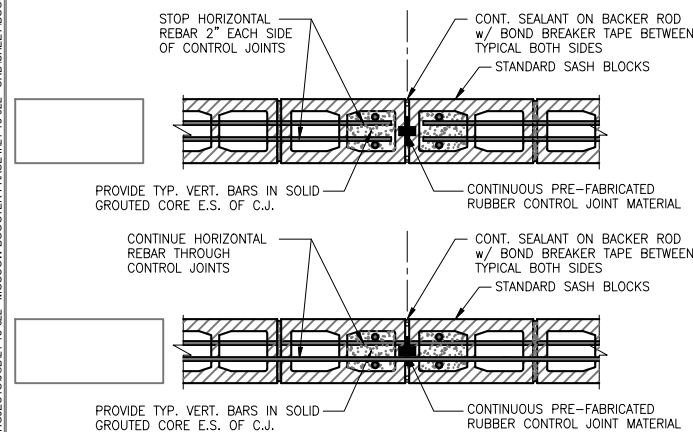
(M5) TYP. CONDUIT PLACEMENT IN MASONRY
SCALE: N.T.S.



M6 TYPICAL 10" CMU DETAIL
SCALE: 3/4"=1'-0"

M7 NOT USED
SCALE: 3/4"=1'-0"

M8 NOT USED
SCALE: 3/4"=1'-0"



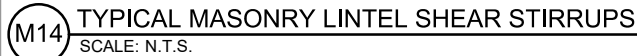
M9 TYP. MASONRY WALL CONTROL JOINT DETAIL
SCALE: N.T.S.

M10 NOT USED
SCALE: 3/4"=1'-0"

NOT USED

M12 NOT USED
SCALE: 3/4"=1'-0"

M13 NOT USED
SCALE: N.T.S.



Page 1349 of 1426 NOT USED
SCALE: N.T.S.



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ORIGINAL
SIGNED BY: DAVID
LEWIS BARNETT
5725
DATE ORIGINAL
SIGNED: 08/12/2022

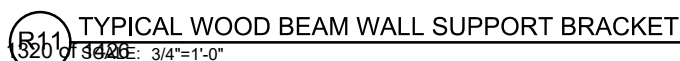
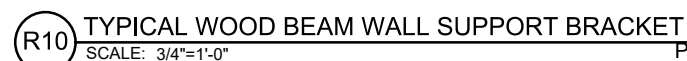
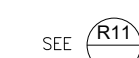
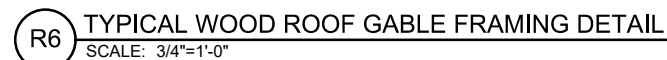
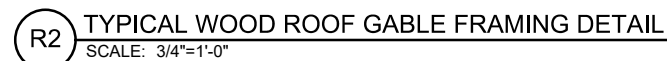
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BOOSTER STATION REPLACEMENTS - PHASE II REBID CITY OF MOSCOW

FILE : 21-18-022-100 S-101X
JUB PROJ. #: 21-18-022
DRAWN BY: DLB
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ARCHITECT
AR-985283



James E. Lemon
STATE OF IDAHO

8-11-202

[illegible]

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

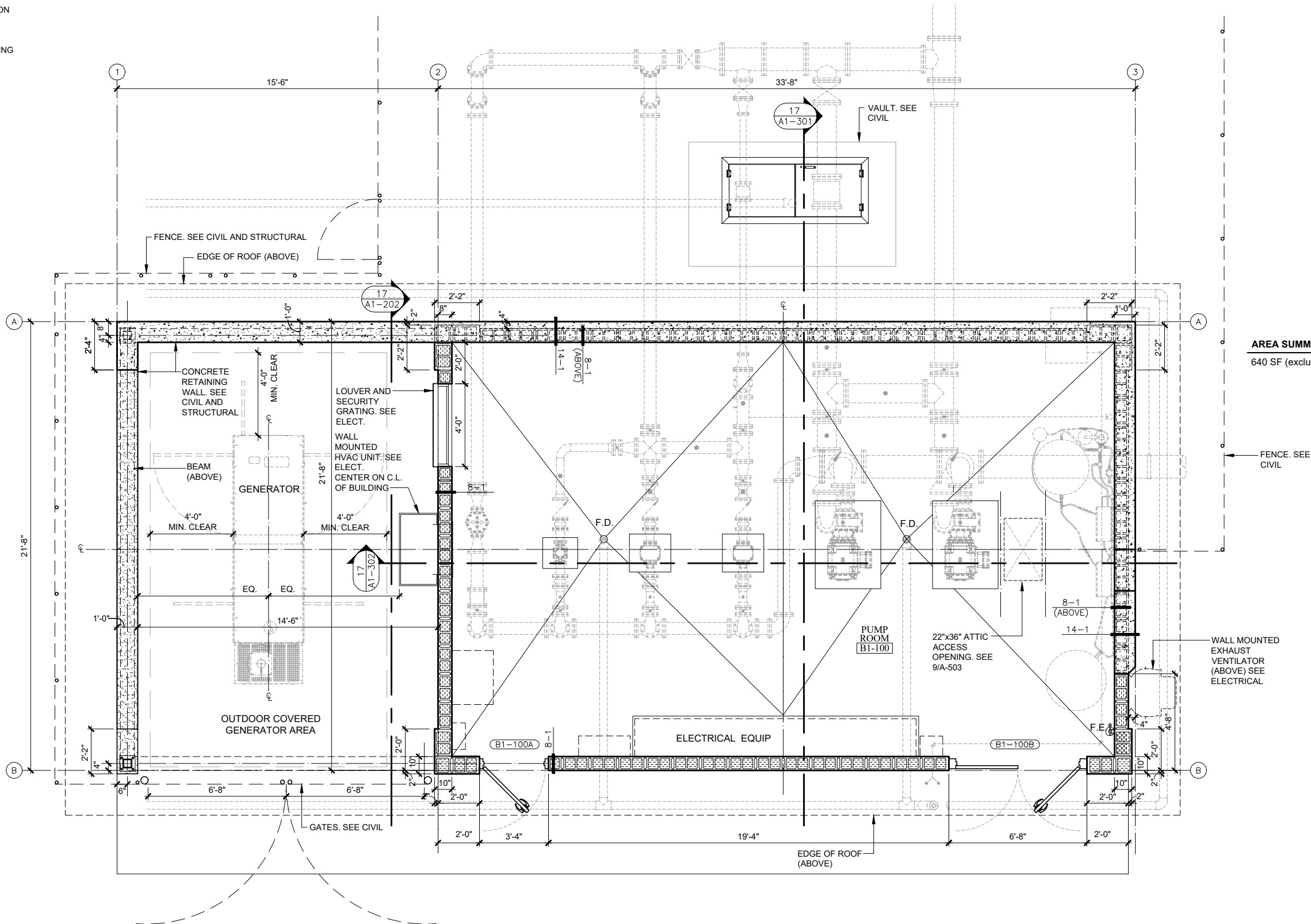
ARCHITECTURAL (A)
INDIAN HILLS BOOSTER PUMP STATION
FLOOR PLAN

FILE : BASE DWGS
JUB PROJ. # : 21-18-022
DRAWN BY: JL
DESIGN BY: JL
CHECKED BY: JL

AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/3/2022

A1-101

1. SEE EXTERIOR ELEVATIONS FOR ADDITIONAL OPENING LOCATIONS AND SIZES.
2. SEE STRUCTURAL, PROCESS, AND ELECTRICAL FOR ADDITIONAL INFORMATION AND CONSTRUCTION REQUIREMENTS.
3. SEE SITE CIVIL FOR FINISH ELEVATIONS AROUND EXTERIOR PERIMETER OF BUILDING AND STRUCTURAL FOR INTERIOR ELEVATIONS.
4. SEE DETAIL 18/A-001 FOR WALL TYPES.



AREA SUMMARY:
640 SF (excludes exterior walls)

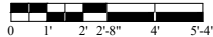
— FENCE. SEE CIVIL

-WALL MOUNTED
EXHAUST
VENTILATOR
(ABOVE) SEE
ELECTRICAL

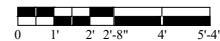
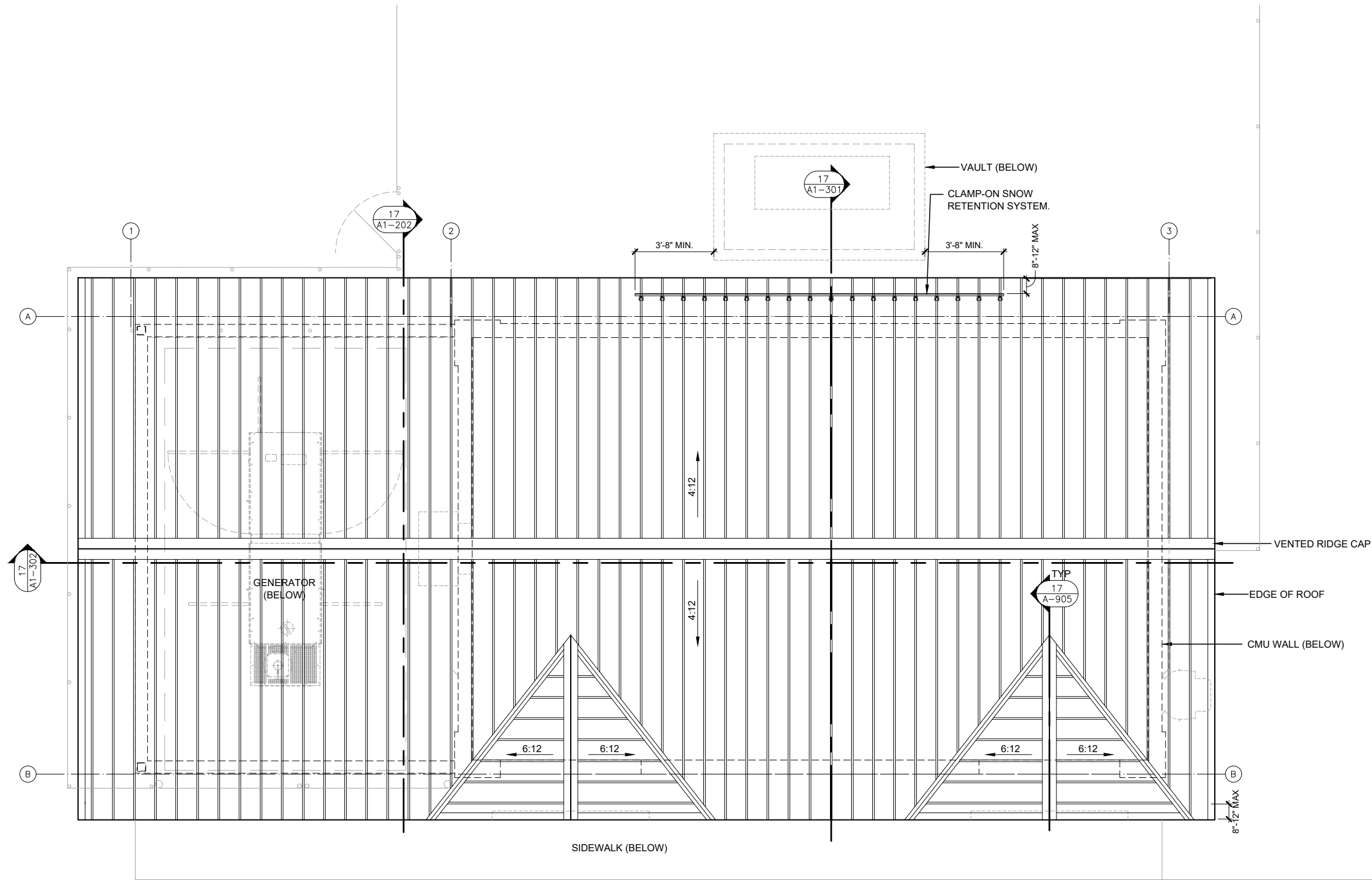
17 | FLOOR PLAN - INDIAN HILLS
SCALE: 3/8" = 1'-0" (3/16" on 11" x 17")

~~Page 1322 of 1426~~

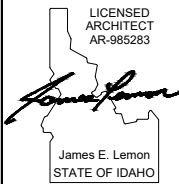
Page 1385



Plot Date: 8/3/2022 4:06 PM Plotted By: Jamie Lemon
Date Created: 7/22/2021 C:\DROPCOP-DRIVE\1810 CITY OF MOSCOW - WATER BOOSTER STATIONS\22 DRAWINGS\22D DESIGN\BASE DWGS.DWG



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8-11-2022

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REVISION			
NO.	DESCRIPTION	BY	DATE

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW
ARCHITECTURAL (A)
INDIAN HILLS BOOSTER PUMP STATION
ROOF PLAN

FILE : BASE DWGS
JUB PROJ. # : 21-18-022
DRAWN BY: JL
DESIGN BY: JL
CHECKED BY: JL
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/3/2022

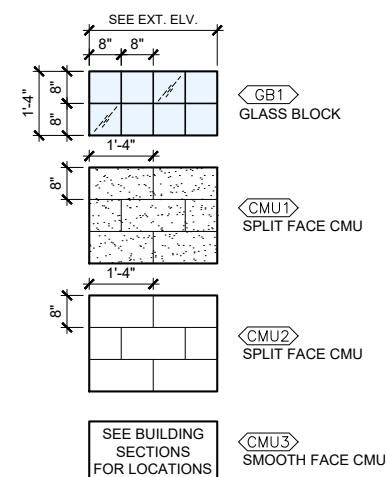


SCALE: 1/2" = 1'-0" (1/4" on 11" x 17")

GENERAL ELEVATION NOTES:

1. SEE MANUFACTURER'S PRODUCT AND COLOR SCHEDULE
ALONG WITH ROOM AND MISCELLANEOUS ITEM FINISH
SCHEDULE ON SHEET A-901 FOR MATERIAL AND COLORS.
2. SEE STRUCTURAL, PROCESS, ELECTRICAL AND MECHANICAL
FOR ADDITIONAL INFORMATION AND CONSTRUCTION
REQUIREMENTS.

MATERIAL LEGEND



GENERAL NOTES:

1. SEE FLOOR PLAN FOR BLOCK DEPTH. VARIES BETWEEN 8" AND 10" AT CORNERS.



SCALE: 1/2" = 1'-0" (1/4" on 11" x 17")

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LICENSED
ARCHITECT
AR-985283

James E. Lemon

James E. Lemon
STATE OF IDAHO

8-11-202

[illegible]

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

ARCHITECTURAL (A)
INDIAN HILLS BOOSTER PUMP STATION
WEST EXTERIOR RETAINING WALL & CANOPY ELEVATIONS

FILE : BASE DWGS
JUB PROJ. # : 21-18-022
DRAWN BY: JL
DESIGN BY: JL
CHECKED BY: JL

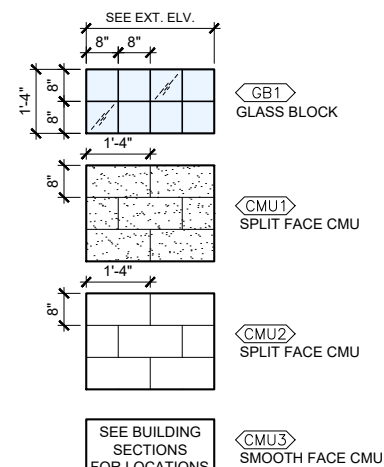
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INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/3/2022

A1-203

GENERAL ELEVATION NOTES:

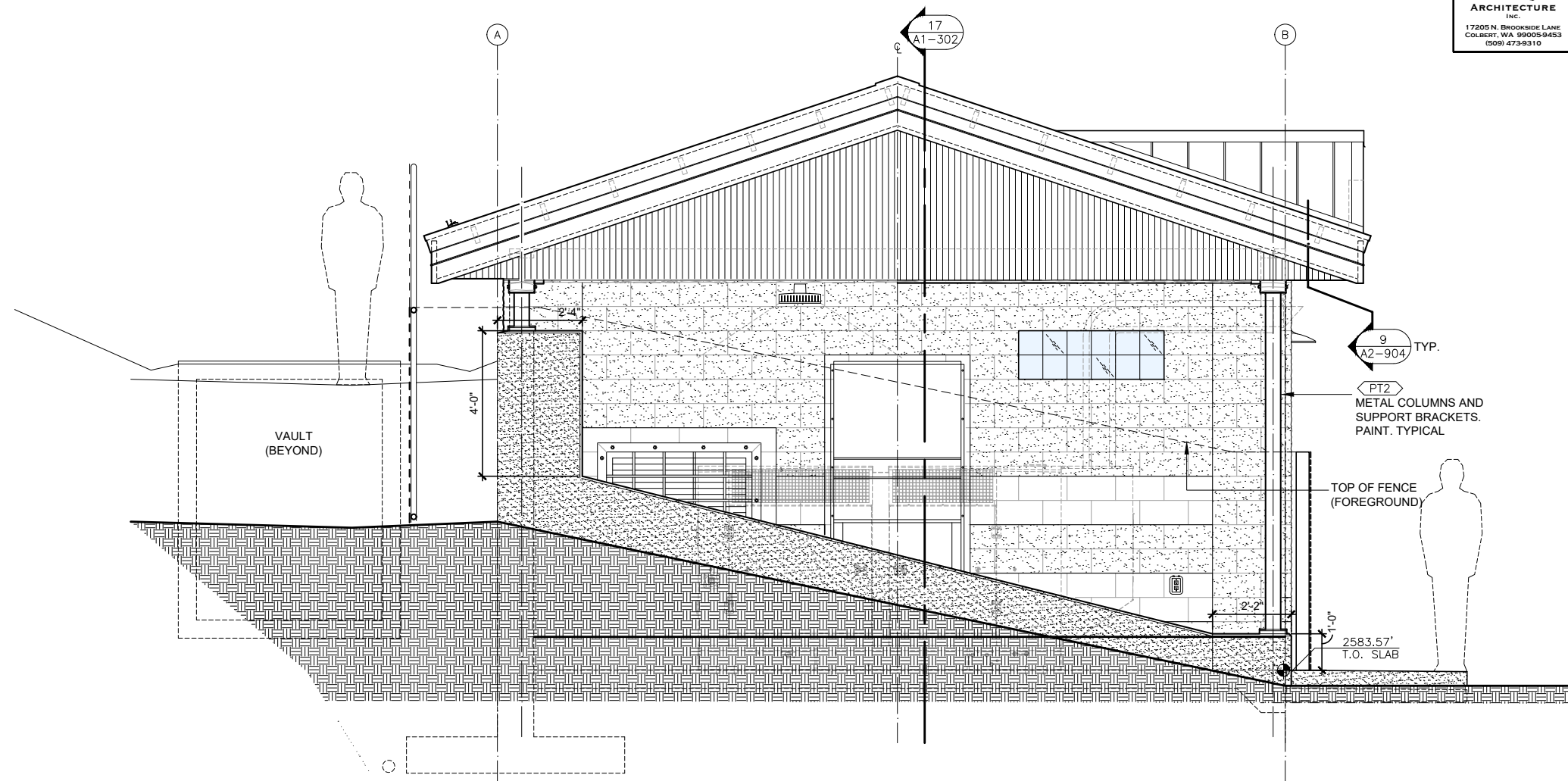
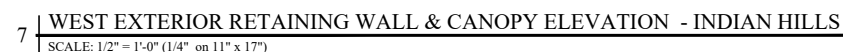
1. SEE MANUFACTURER'S PRODUCT AND COLOR SCHEDULE ALONG WITH ROOM AND MISCELLANEOUS ITEM FINISH SCHEDULE ON SHEET A-901 FOR MATERIAL AND COLORS.
2. SEE STRUCTURAL, PROCESS, ELECTRICAL AND MECHANICAL FOR ADDITIONAL INFORMATION AND CONSTRUCTION REQUIREMENTS.

MATERIAL LEGEND

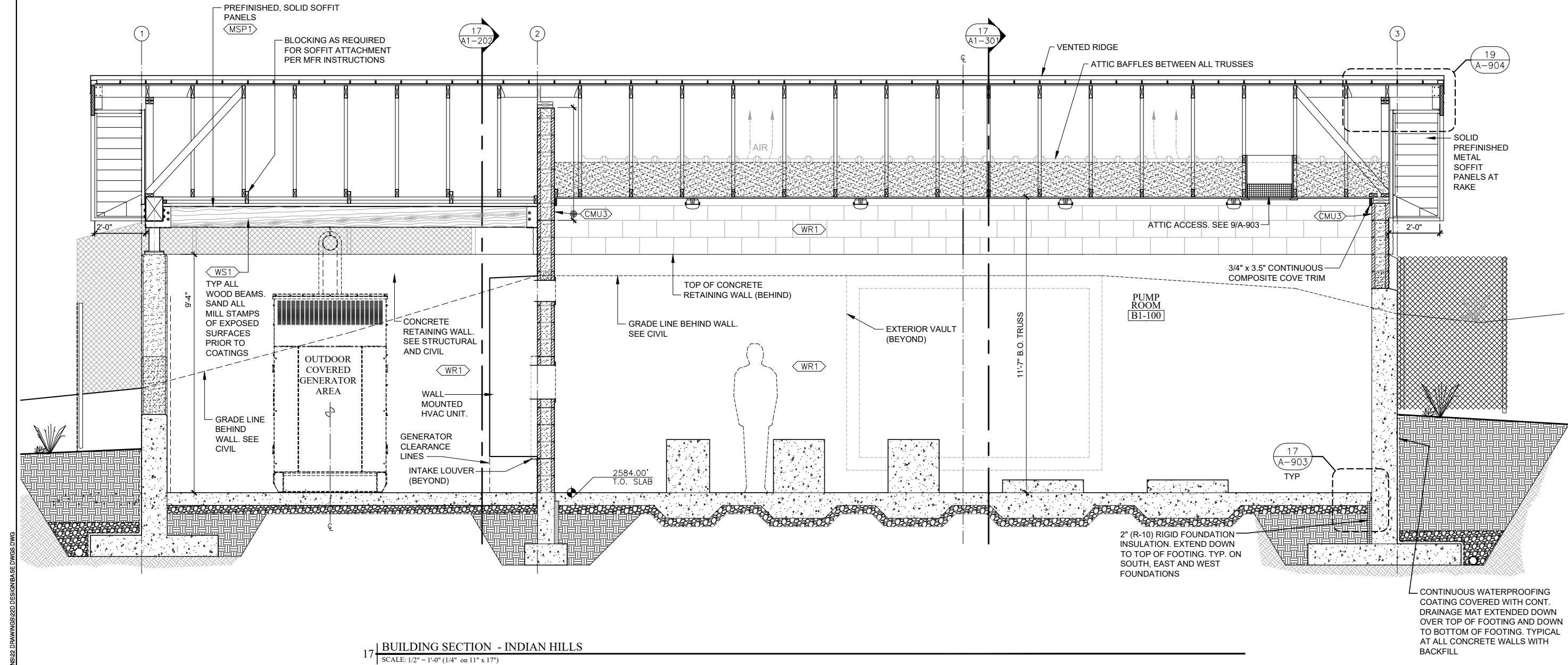


GENERAL NOTES:

1. SEE FLOOR PLAN FOR BLOCK DEPTH. VARIES BETWEEN 8" AND 10" AT CORNERS.



Plot Date: 8/3/2022 4:44 PM Plotted By: Jamie Lemon
Date Created: 8/22/2021 C:\DORP\BOP\ DRIVE\1810 CITY OF MOSCOW - WATER BOOSTER STATIONS\22 DRAWINGS\22D DESIGN\BASE DWGS.DWG



17 BUILDING SECTION - INDIAN HILLS
SCALE: 1/2" = 1'-0" (1/4" on 11" x 17")



J-U-B ENGINEERS, INC.
201 South Jackson Street
Moscow, ID 83843
Phone: 208.746.9010
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LICENSED ARCHITECT
AR-985283
James E. Lemon
STATE OF IDAHO

REVISION			
NO.	DESCRIPTION	BY	DATE

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW
ARCHITECTURAL (A)
INDIAN HILLS BOOSTER PUMP STATION
BUILDING SECTION

FILE: BASE DWGS
JUB PROJ. #: 21-18-022
DRAWN BY: JL
DESIGN BY: JL
CHECKED BY: JL
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/3/2022

A1-302

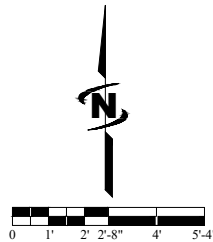
Plot Date: 8/3/2022 4:28 PM Plotted By: Jamie Lemon
Date Created: 7/27/2021 C:\DROPOUT_DRIVE\1810 CITY OF MOSCOW - WATER BOOSTER STATIONS\2D DRAWINGS\2D DESIGN\BASE DWGS.DWG

GENERAL NOTES:

1. SEE EXTERIOR ELEVATIONS FOR ADDITIONAL OPENING LOCATIONS AND SIZES.
2. SEE STRUCTURAL, PROCESS, AND ELECTRICAL FOR ADDITIONAL INFORMATION AND CONSTRUCTION REQUIREMENTS.
3. SEE SITE CIVIL FOR FINISH ELEVATIONS AROUND EXTERIOR PERIMETER OF BUILDING AND STRUCTURAL FOR INTERIOR ELEVATIONS.
4. SEE DETAIL 18/A-001 FOR WALL TYPES.

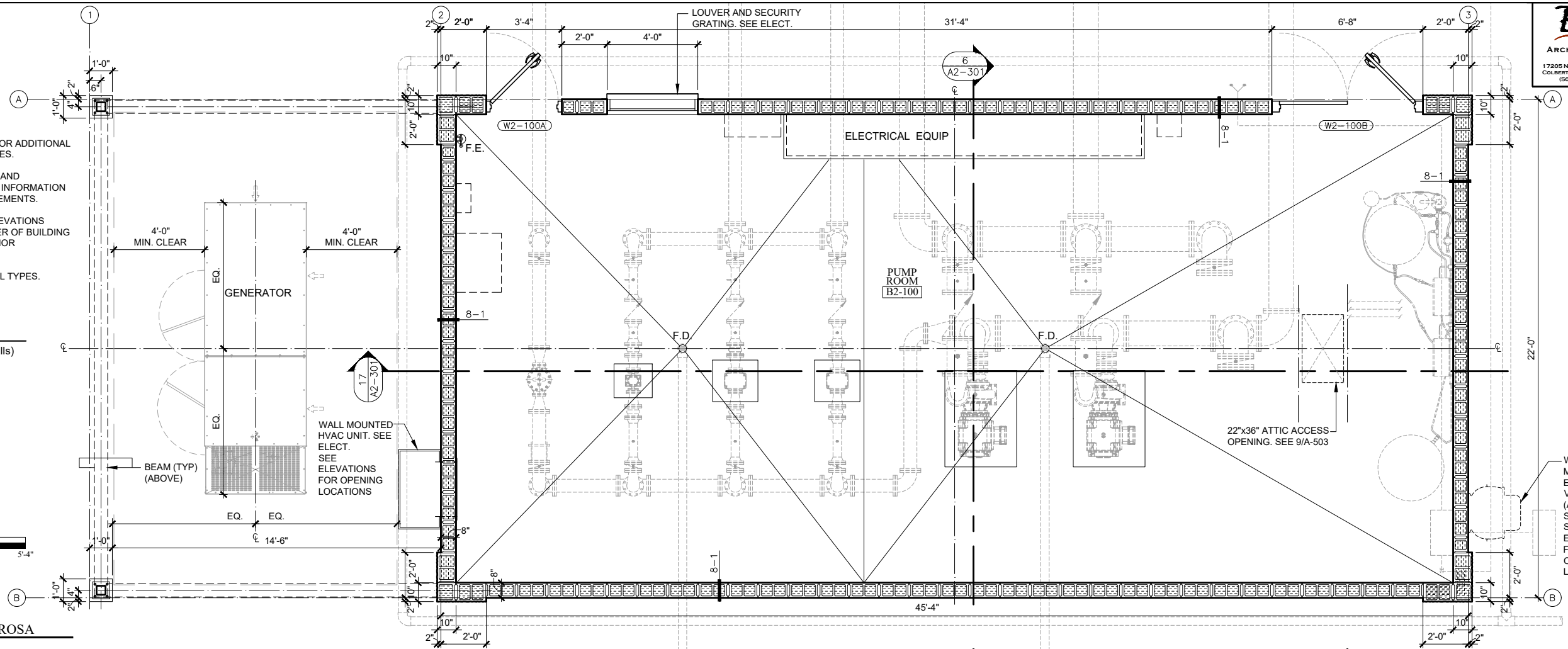
AREA SUMMARY:

909 SF (excludes exterior walls)



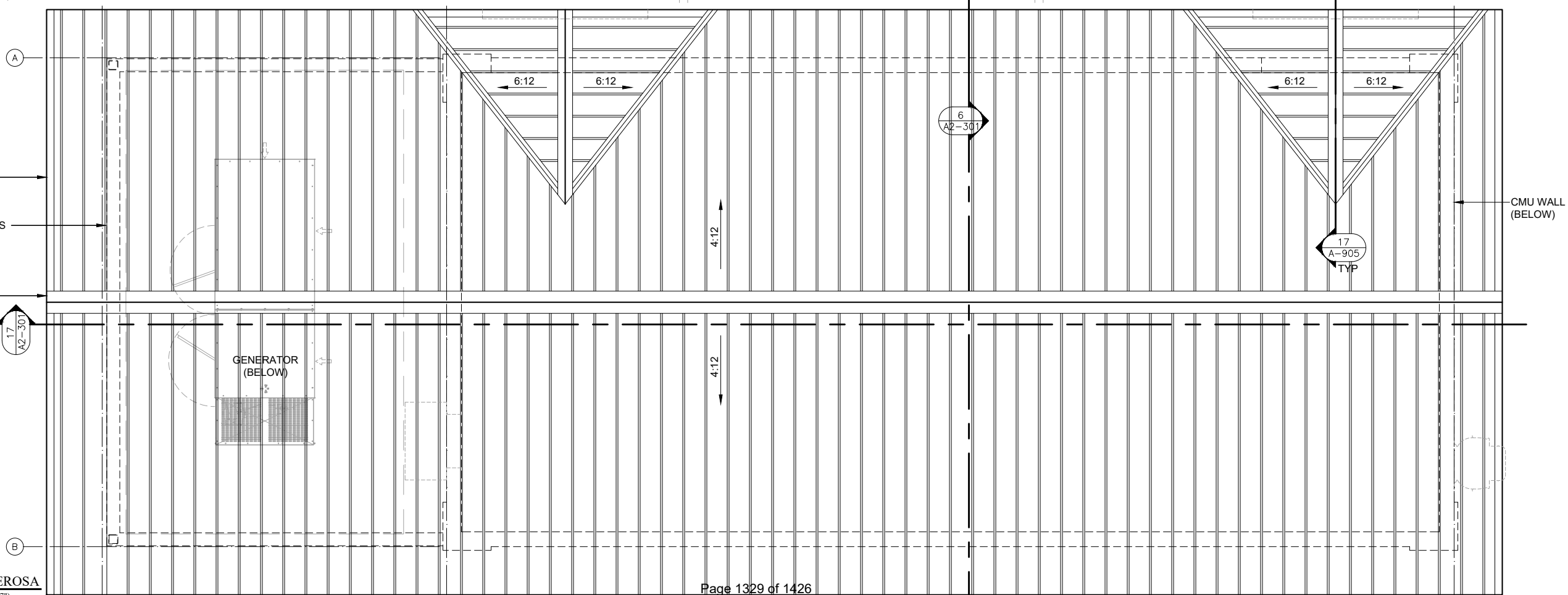
6 FLOOR PLAN - PONDEROSA

SCALE: 3/8" = 1'-0" (3/16" on 11" x 17")



16 ROOF PLAN - PONDEROSA

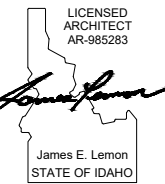
SCALE: 3/8" = 1'-0" (3/16" on 11" x 17")



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BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

ARCHITECTURAL (A)
PONDEROSA BOOSTER PUMP STATION
FLOOR PLAN

FILE : BASE DWGS
JUB PROJ. # : 21-18-022
DRAWN BY: JL
DESIGN BY: JL
CHECKED BY: JL
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/3/2022

A2-101

Plot Date: 8/3/2022 4:28 PM Plotted By: Jamie Lemon
Date Created: 7/27/2021 C:\DROPOUT\DRIVE1\810 CITY OF MOSCOW - WATER BOOSTER STATIONS\22 DRAWINGS\22D DESIGN\BASE DWGS.DWG

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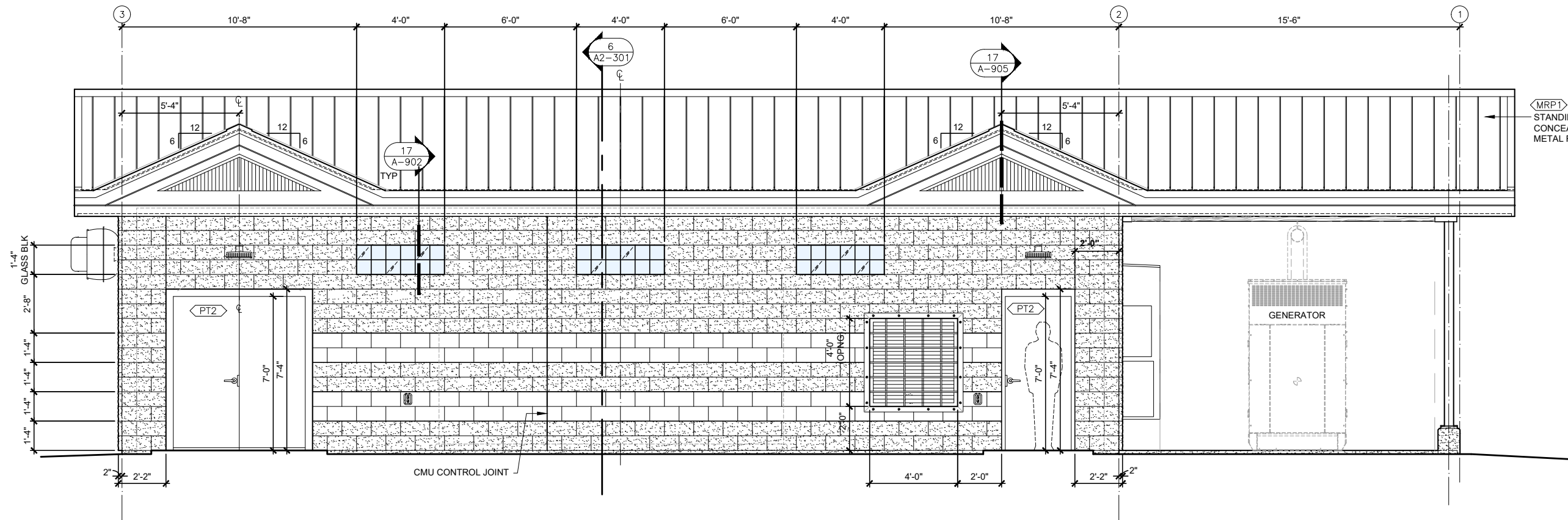
NO.	REVISION	DESCRIPTION	BY	DATE

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

ARCHITECTURAL (A)
PONDEROSA BOOSTER PUMP STATION
NORTH & EAST EXTERIOR ELEVATIONS

FILE: BASE DWGS
JUB PROJ. #: 21-18-022
DRAWN BY: JL
DESIGN BY: JL
CHECKED BY: JL
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/3/2022

A2-201

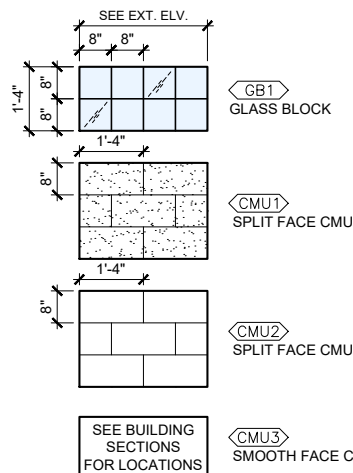


6 NORTH EXTERIOR ELEVATION - PONDEROSA
SCALE: 1/2" = 1'-0" (1/4" on 11" x 17")

GENERAL ELEVATION NOTES:

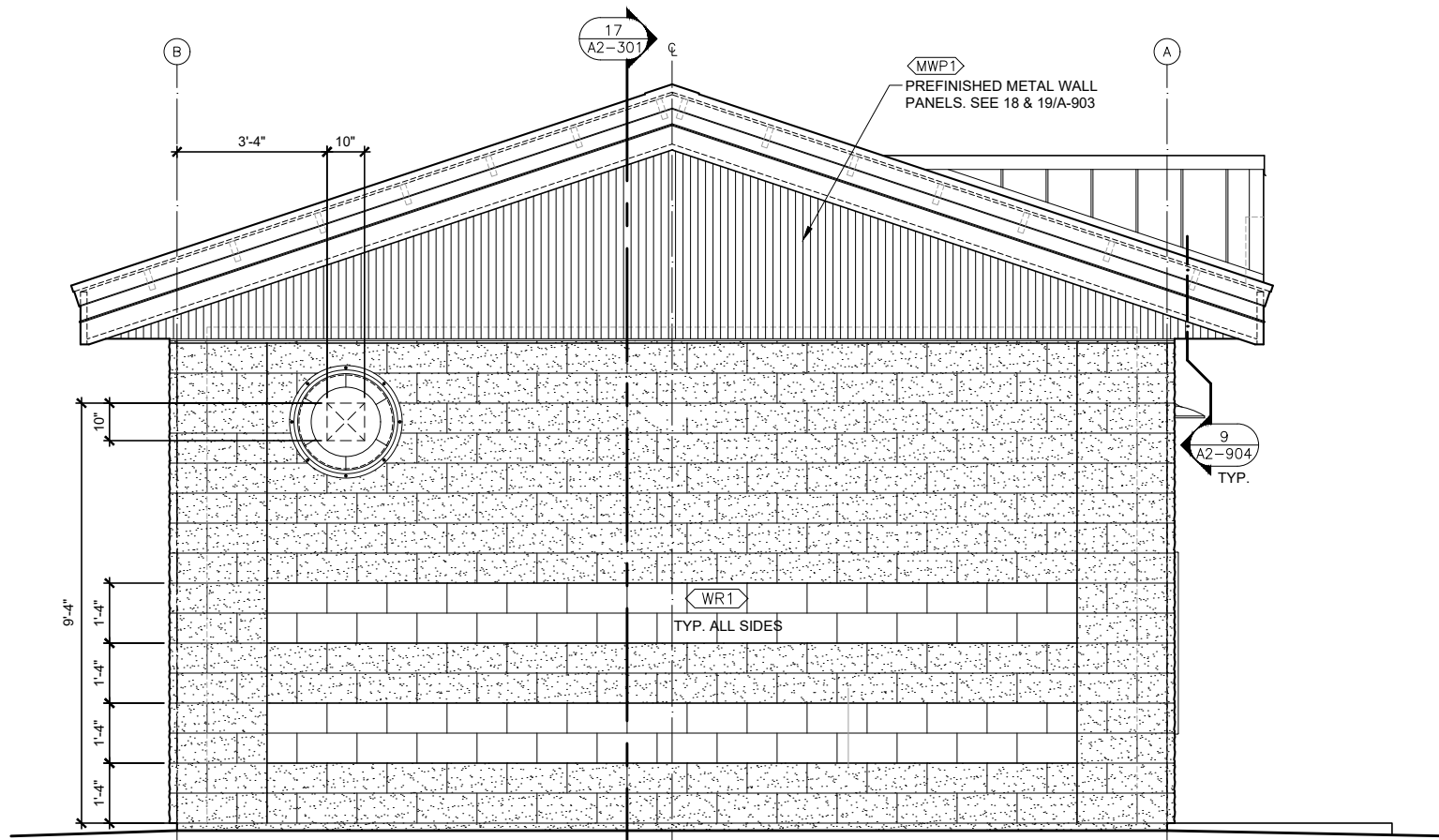
1. SEE MANUFACTURER'S PRODUCT AND COLOR SCHEDULE
ALONG WITH ROOM AND MISCELLANEOUS ITEM FINISH
SCHEDULE ON SHEET A-901 FOR MATERIAL AND COLORS.
2. SEE STRUCTURAL, PROCESS, ELECTRICAL AND MECHANICAL
FOR ADDITIONAL INFORMATION AND CONSTRUCTION
REQUIREMENTS.

MATERIAL LEGEND



GENERAL NOTES:

1. SEE FLOOR PLAN FOR BLOCK DEPTH. VARIES
BETWEEN 8" AND 10" AT CORNERS.



18 EAST EXTERIOR ELEVATION - PONDEROSA
SCALE: 1/2" = 1'-0" (1/4" on 11" x 17")

Plot Date: 8/3/2022 4:01 PM Plotted By: James E. Lemon
Date Created: 8/2/2022 C:\DROPPBOX\DRIVE1\810 CITY OF MOSCOW - WATER BOOSTER STATIONS\22 DRAWINGS\22D DESIGN\BASE DWGS.DWG

8-11-2022

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REVISION			
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BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW
ARCHITECTURAL (A)
PONDEROSA BOOSTER PUMP STATION
SOUTH & WEST EXTERIOR ELEVATIONS

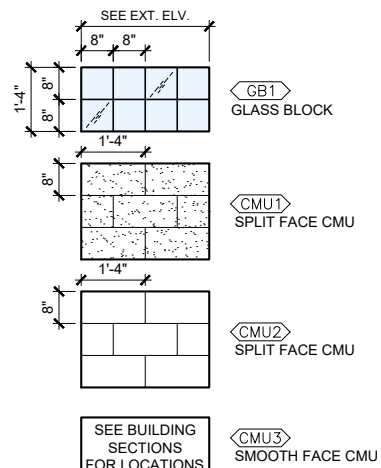
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JUB PROJ. #: 21-18-022
DRAWN BY: JL
DESIGN BY: JL
CHECKED BY: JL
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/3/2022

A2-202

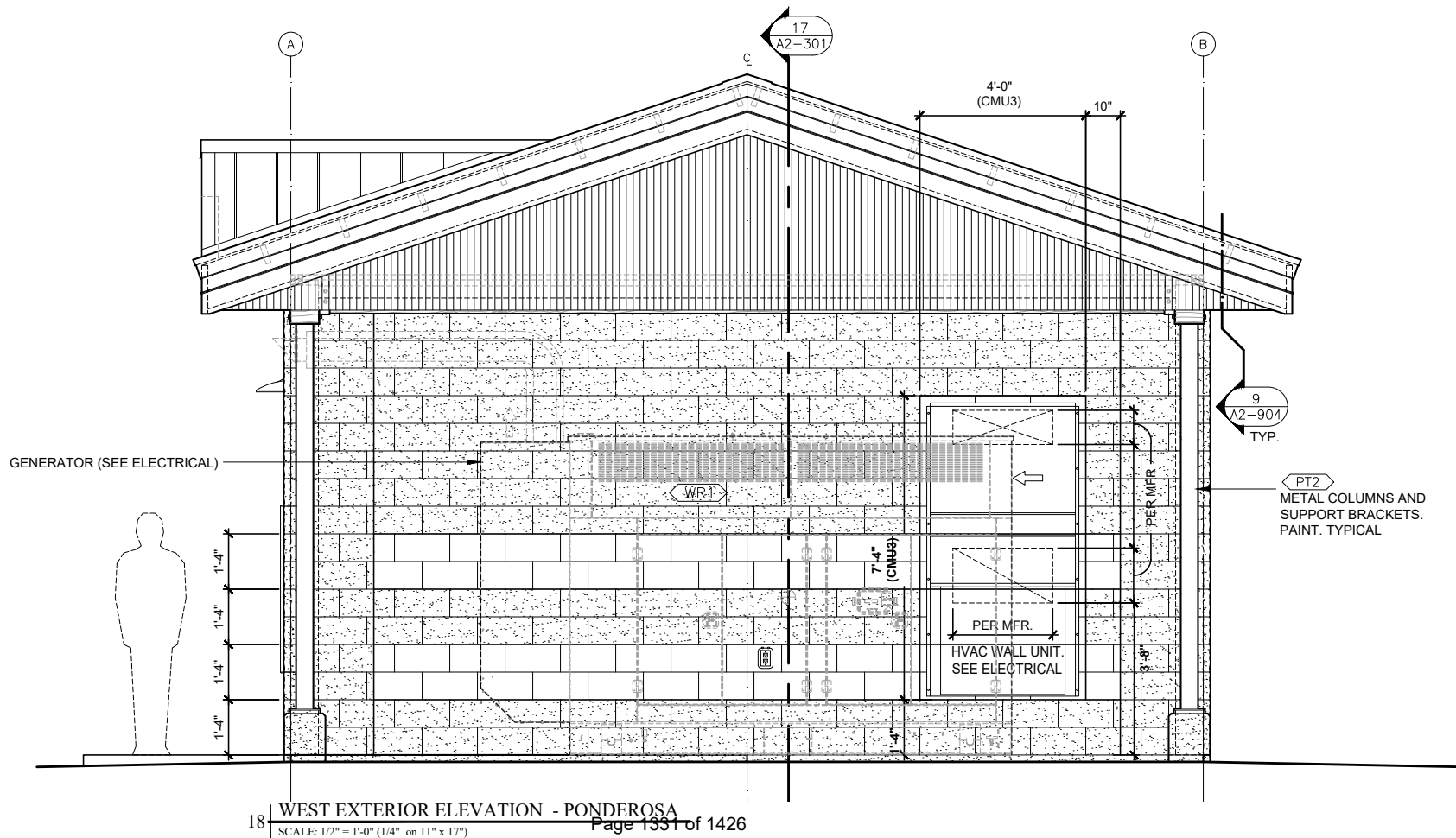
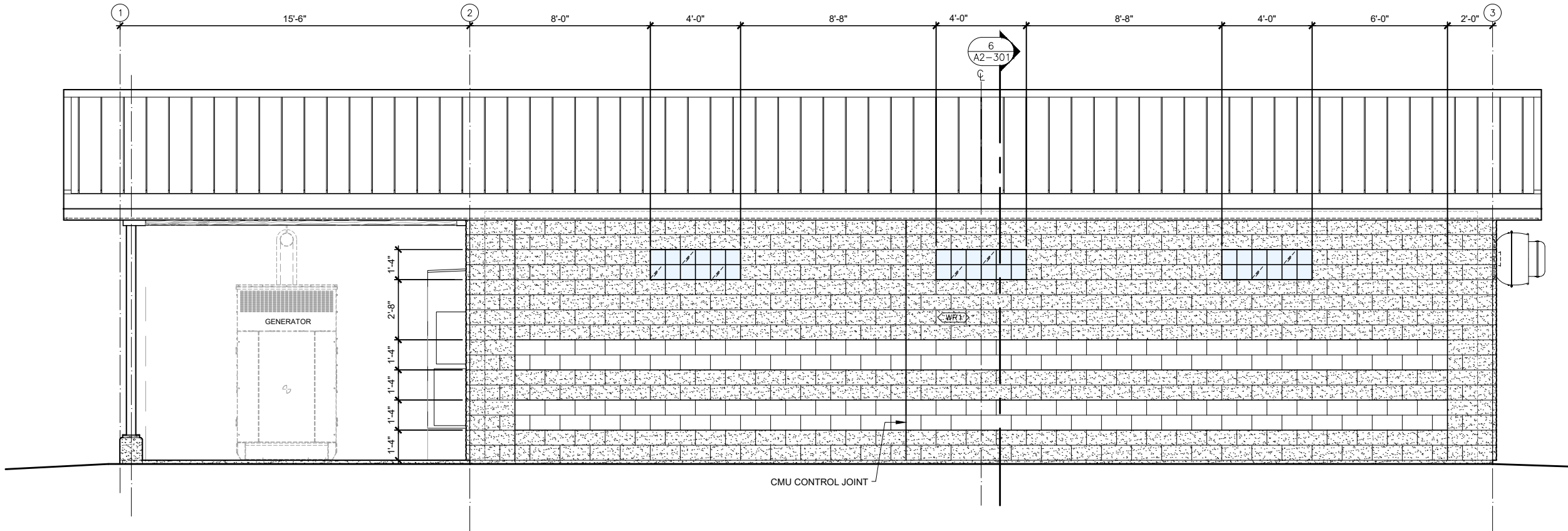
6 SOUTH EXTERIOR ELEVATION - PONDEROSA
SCALE: 3/8" = 1'-0" (3/16" on 11" x 17")

- GENERAL ELEVATION NOTES:**
- SEE MANUFACTURER'S PRODUCT AND COLOR SCHEDULE ALONG WITH ROOM AND MISCELLANEOUS ITEM FINISH SCHEDULE ON SHEET A-901 FOR MATERIAL AND COLORS.
 - SEE STRUCTURAL, PROCESS, ELECTRICAL AND MECHANICAL FOR ADDITIONAL INFORMATION AND CONSTRUCTION REQUIREMENTS.

MATERIAL LEGEND



GENERAL NOTES:
1. SEE FLOOR PLAN FOR BLOCK DEPTH. VARIES BETWEEN 8" AND 10" AT CORNERS.



18 WEST EXTERIOR ELEVATION - PONDEROSA
SCALE: 1/2" = 1'-0" (1/4" on 11" x 17")

This architectural cross-section drawing illustrates the construction details of a pump room. The roof features a VENTED RIDGE CAP and STANDING SEAM METAL ROOF, supported by trusses with ATTIC BAFFLES BETWEEN ALL TRUSSES. The roof slope is indicated as 12/4. The exterior walls are constructed from CMU (Concrete Masonry Units) with various heights: 5'-4" on the left, 1'-4" sections, and 11'-7" B.O. TRUSS height on the right. The interior wall shows R-38 BLOWN-IN ATTIC INSULATION and 1/2" ACX PLYWOOD INFILL ALL JOINTS AND FASTENER HOLES PRIOR TO PAINTING. A VAPOR BARRIER is also shown. The floor consists of a 2662.00' T.O. SLAB and 2" (R-10) RIGID FOUNDATION INSULATION, EXTEND DOWN TO TOP OF FOOTING. TYP. A foundation drain is located at the base of the walls. The central area contains a PUMP ROOM with a B2-100 unit. Other details include COMPOSITE COVE TRIM, WR1, and various material callouts like 11 A-904, 16 A-904, 17 A2-301, and 9 A2-904.

Page 1395

Plot Date: 7/26/2015 2:41 PM Plotted By: Jamia Lemon
Date Created: 2/2/2021 C:\ORP\ORP_DRIVE\1810 CITY OF MOSCOW - WATER BOOSTER STATIONS\22 DRAWINGS\22D DESIGNS\SCHEDULES-DTLS-CODES.DWG

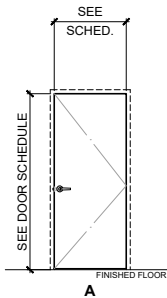
LOC'N CODE	DOOR NO.	DOOR							FRAME					FIRE RATING	DETAILS			HARDWARE GROUP	NOTES
		WIDTH	HEIGHT	THICKNESS	MATL.	GLAZING	FINISH	TYPE	DEPTH	MATL.	FINISH	SEAL	TYPE		HEAD	JAMB	THRESHOLD		
INDIAN HILLS BOOSTER PUMP STATION (B1)																			
B1	100A	3'-0"	7'-0"	1-3/4"	Metal	No	PT2	A	5 3/4"	Metal	PT2	Weather	1	N/A	8/A-902	13/A-902	18/A-902	HW-01	
B1	100B	PAIR 3'-0"	7'-0"	1-3/4"	Metal	No	PT2	A/A	5 3/4"	Metal	PT2	Weather	2	N/A	8/A-902	13/A-902	18/A-902	HW-02	
PONDEROSA BOOSTER PUMP STATION (B2)																			
B2	100A	3'-0"	7'-0"	1-3/4"	Metal	No	PT2	A	5 3/4"	Metal	PT2	Weather	1	N/A	8/A-902	13/A-902	18/A-902	HW-01	
B2	100B	PAIR 3'-0"	7'-0"	1-3/4"	Metal	No	PT2	A/A	5 3/4"	Metal	PT2	Weather	2	N/A	8/A-902	13/A-902	18/A-902	HW-02	

17205 N. BROOKSIDE LANE
COLLETT, WA 99005-0455
(509) 473-9310

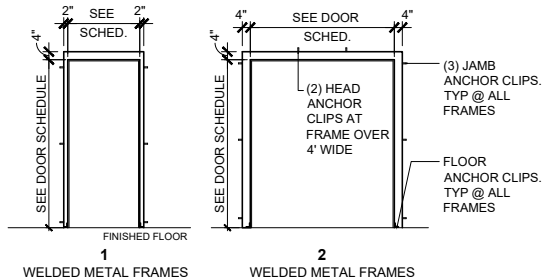
NOTE:
1. ALL DOOR LEAFS AND FRAMES TO BE PAINTED PRIOR TO INSTALLATION OF ANY DOOR HARDWARE.

1 DOOR AND FRAME SCHEDULE

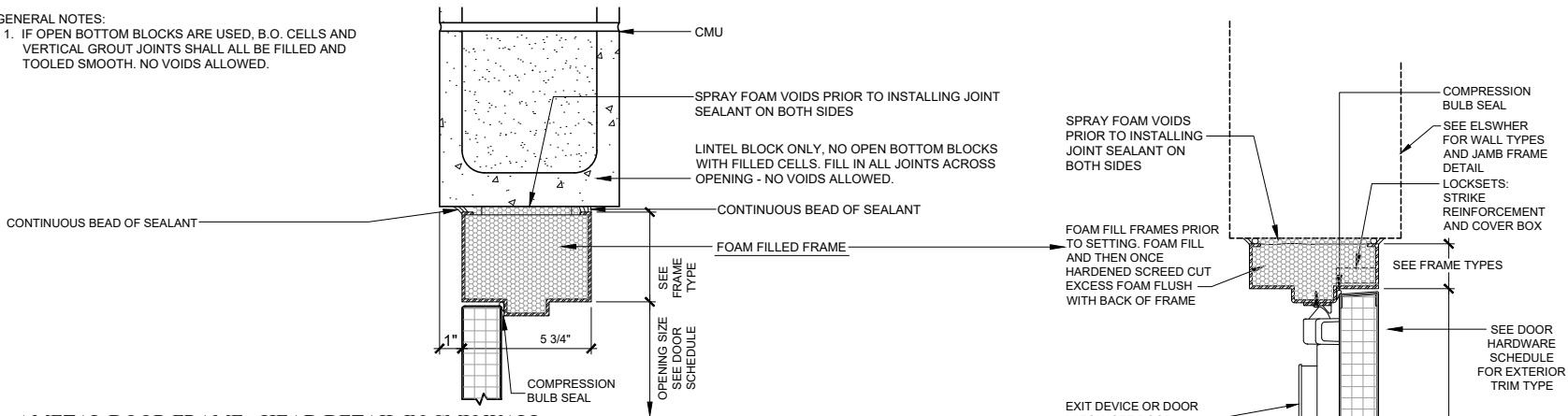
SCALE: NTS



NOTES:
1. DOOR ELEVATIONS ARE SCHEMATIC IN NATURE. THE CONTRACTOR TO PROVIDE EQUIPMENT AND MATERIALS TO MEET ALL SPECIFICATION REQUIREMENTS.
2. SEE SECTION 08110 FOR ADDITIONAL REQUIREMENTS.

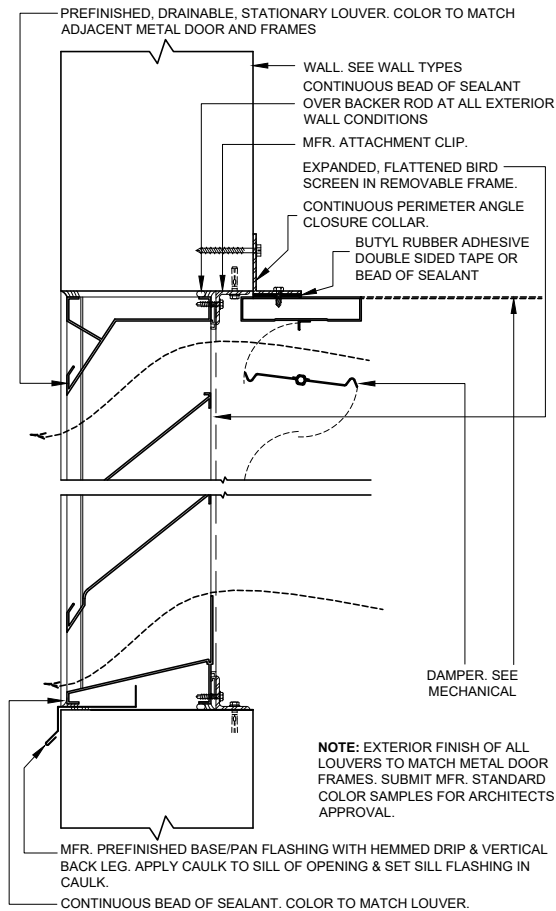


GENERAL NOTES:
1. IF OPEN BOTTOM BLOCKS ARE USED, B.O. CELLS AND VERTICAL GROUT JOINTS SHALL ALL BE FILLED AND TOOLED SMOOTH. NO VOIDS ALLOWED.



6 DOOR TYPES

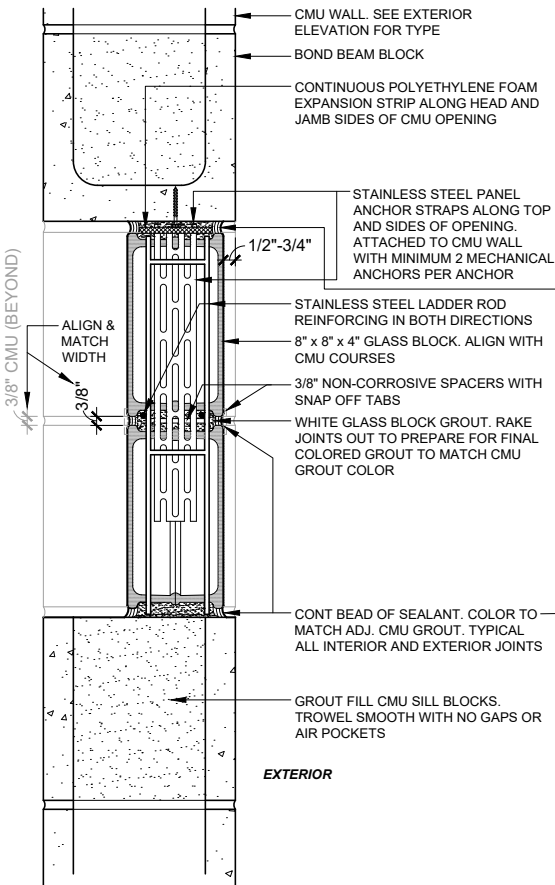
SCALE: 1/4" = 1'-0" (1/8" on 11" x 17")



NOTE: EXTERIOR FINISH OF ALL LOUVERS TO MATCH METAL DOOR FRAMES. SUBMIT MFR. STANDARD COLOR SAMPLES FOR ARCHITECTS APPROVAL.

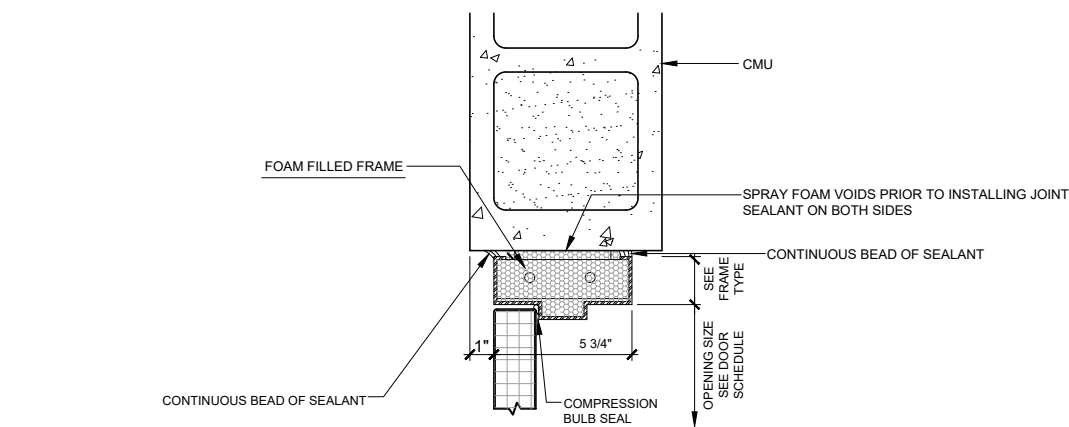
7 DOOR & FRAME TYPES

SCALE: 1/4" = 1'-0" (1/8" on 11" x 17")



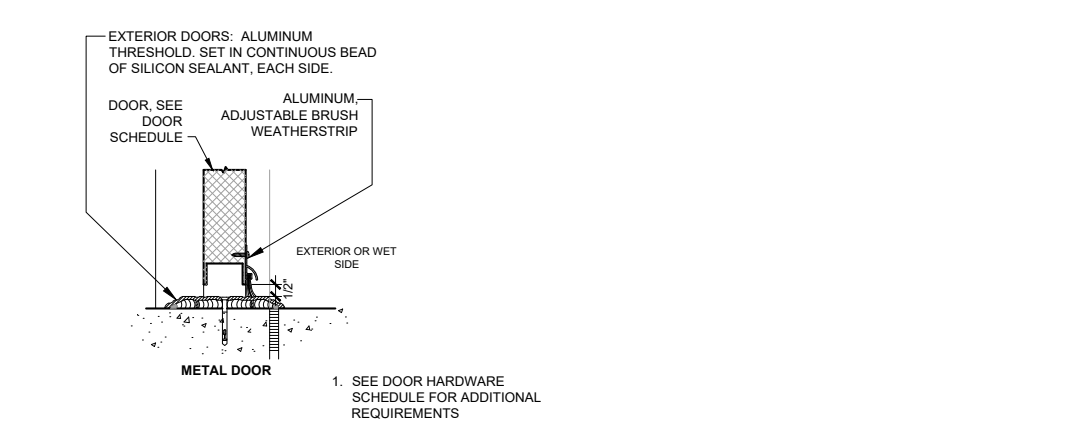
8 METAL DOOR FRAME - HEAD DETAIL IN CMU WALL

SCALE: 3" = 1'-0" (1 1/2" = 1'-0" on 11" x 17")



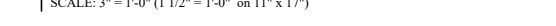
13 METAL DOOR FRAME - JAMB DETAIL IN CMU WALL

SCALE: 3" = 1'-0" (1 1/2" = 1'-0" on 11" x 17")



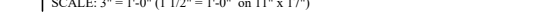
16 LOUVER DETAIL

SCALE: 3" = 1'-0" (1 1/2" = 1'-0" on 11" x 17")



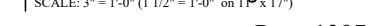
17 GLASS BLOCK - HEAD & SILL (JAMB SIM.)

SCALE: 3" = 1'-0" (1 1/2" = 1'-0" on 11" x 17")



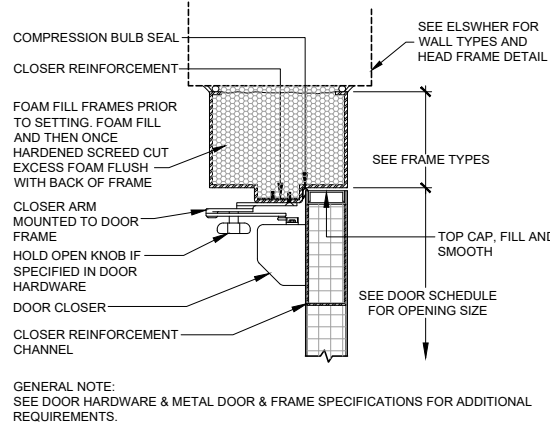
18 DOOR BOTTOM SWEEP & THRESHOLD

SCALE: 3" = 1'-0" (1 1/2" = 1'-0" on 11" x 17")



15 DOOR HARDWARE - JAMB

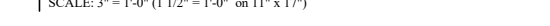
SCALE: 3" = 1'-0" (1 1/2" = 1'-0" on 11" x 17")



GENERAL NOTE:
SEE DOOR HARDWARE & METAL DOOR & FRAME SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

20 DOOR HARDWARE - HEAD

SCALE: 3" = 1'-0" (1 1/2" = 1'-0" on 11" x 17")



GENERAL NOTE:
SEE DOOR HARDWARE & METAL DOOR & FRAME SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

REVISION	DATE	BY	APPROVED
1			
2			
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BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW
ARCHITECTURAL (A)
GENERAL DETAILS
DOOR SCHEDULE, DOOR & FRAME TYPES, OPENING DETAILS

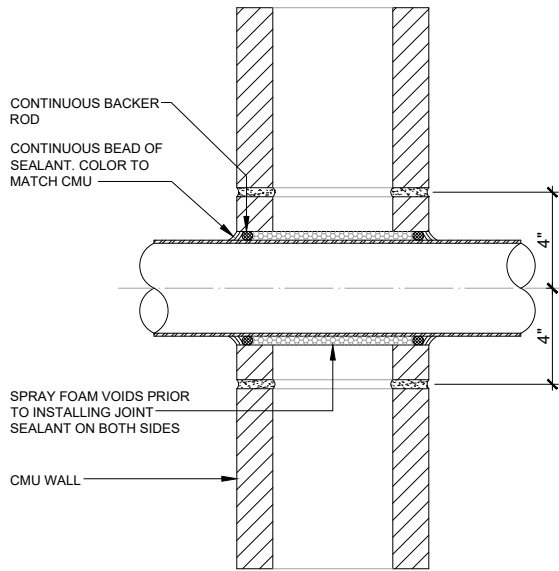
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JUB PROJ. #: 21-18-022
DRAWN BY: JL
DESIGN BY: JL
CHECKED BY: JL
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 4/24/2018

SHEET NUMBER:

A-902

Plot Date: 3/3/2022 4:50 PM Plotted By: James Lemon
Date Created: 2/22/2021 C:\DROPPBOX\DRIVE\1810 CITY OF MOSCOW - WATER BOOSTER STATIONS\22 DRAWINGS\22D DESIGNS\SCHEDULES-DTLS-CODES.DWG

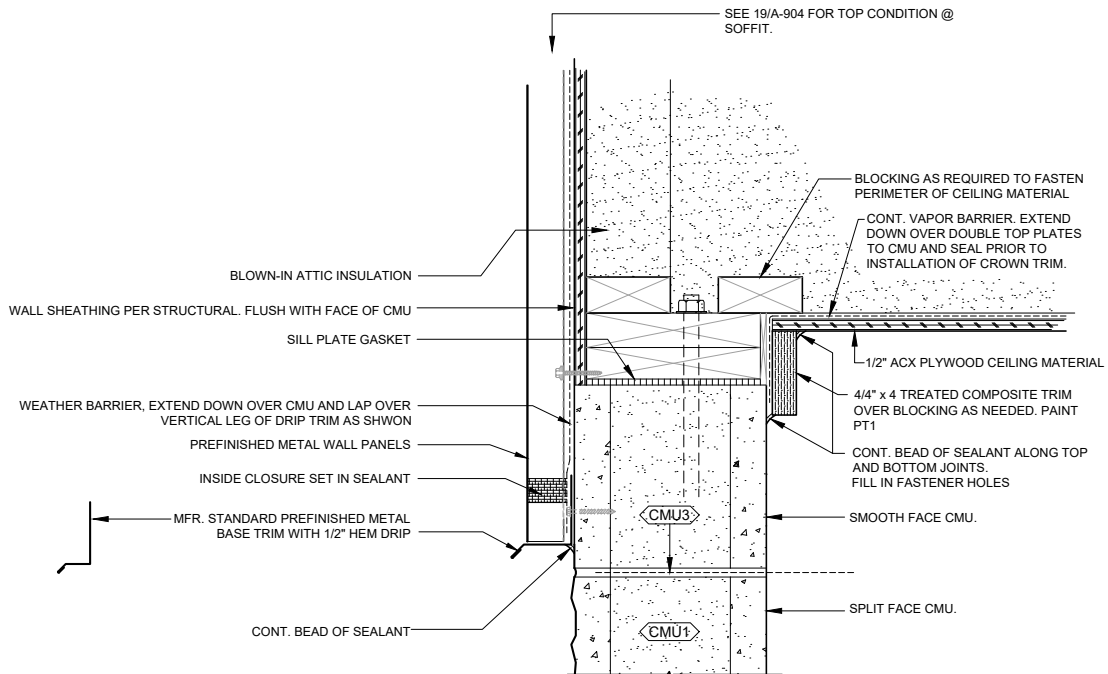
GENERAL NOTES:
1. DETAIL AT PIPES THAT WILL NOT EXCEED 200° F OPERATING TEMPERATURE.
2. DETAIL FOR NON-RATED WALL ASSEMBLIES.



6 | PIPE/CONDUIT PENTRATION THROUGH CMU

SCALE: 3" = 1'-0" (1 1/2" = 1'-0" on 11" x 17")

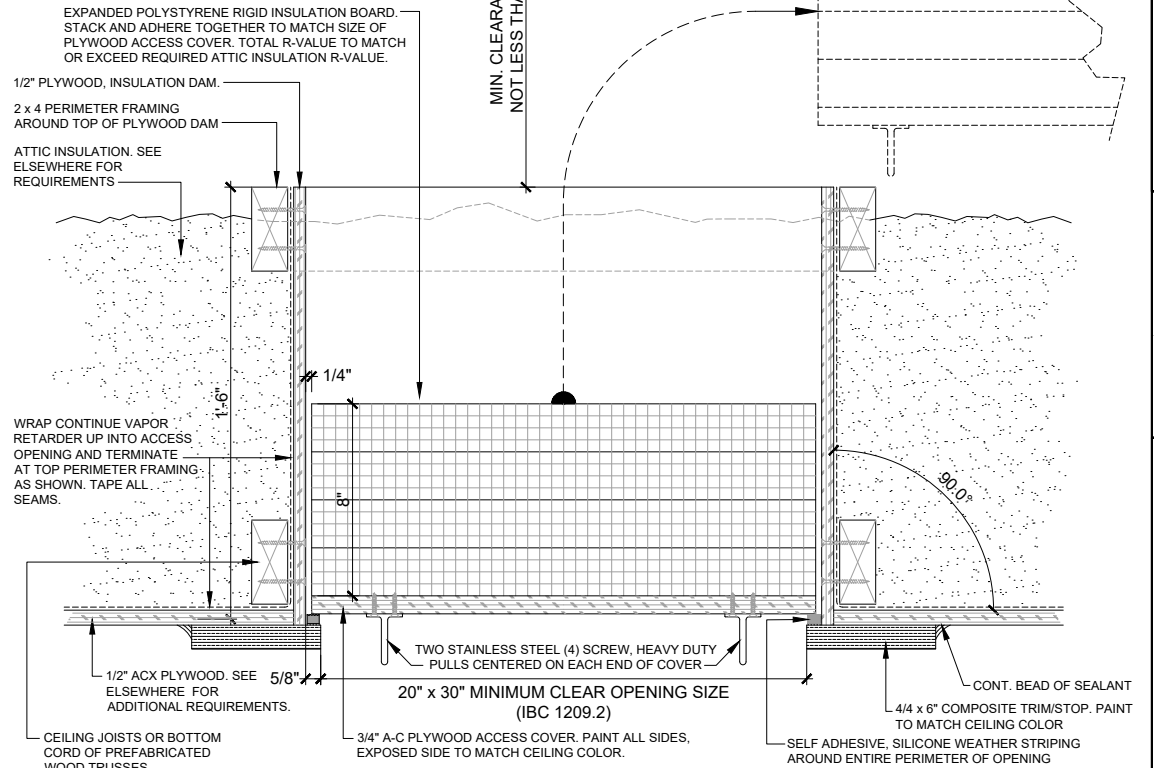
GENERAL NOTE: PRIOR TO INSTALLING FLASHING, METAL SIDING, ETC. INSTALL CMU WALL REPELLENT. SEE SPECIFICATION SECTION 07191



7 | PREFINISHED WALL PANEL DETAIL @ GABLE ENDS

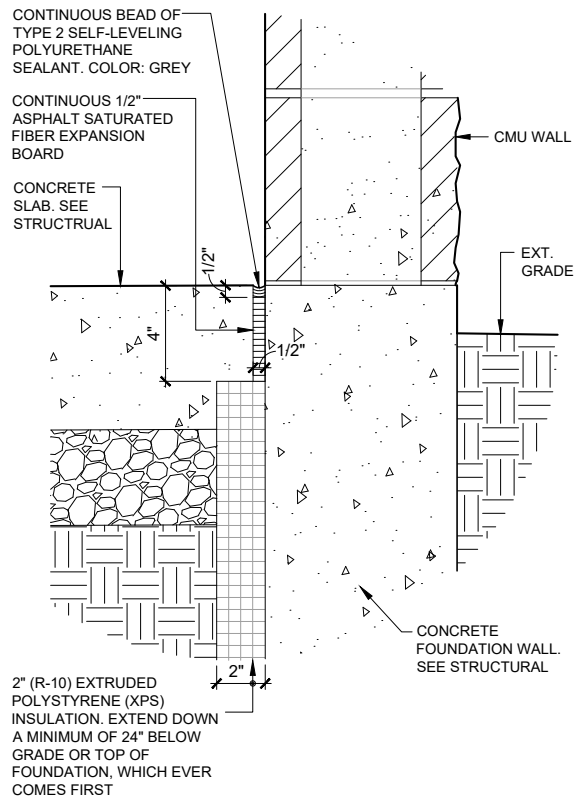
SCALE: 3" = 1'-0" (1 1/2" = 1'-0" on 11" x 17")

GENERAL NOTES:
1. ATTIC ACCESS OPENING SHALL BE PROVIDED TO ANY ATTIC AREA HAVING A CLEAR HEIGHT OF OVER 30 INCHES.
2. HEADROOM CLEARANCE SHALL NOT BE LESS THAN 30 INCHES OVER TOP EDGE OF INSULATION DAM.
3. PROVIDE ACCESS OPENING ON EACH SIDE OF ATTIC WALL.



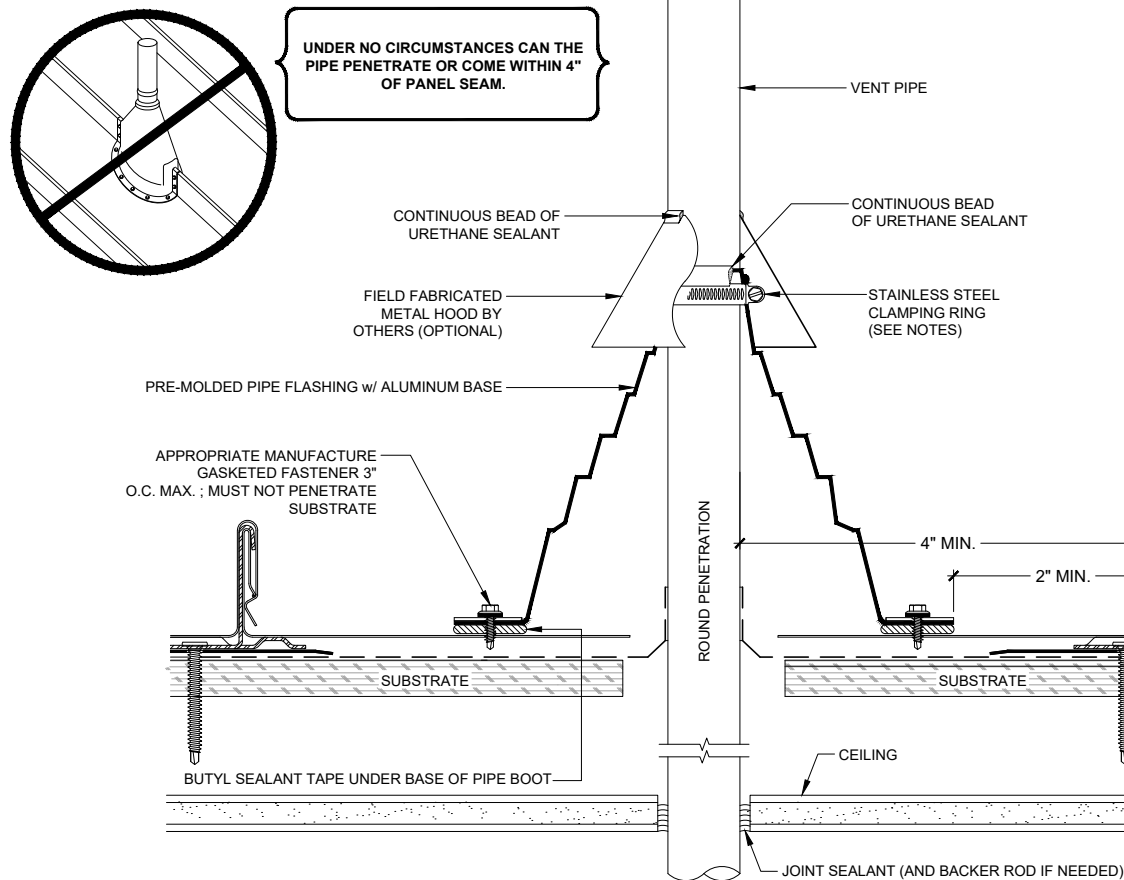
9 | ATTIC ACCESS

SCALE: 3" = 1'-0" (1 1/2" = 1'-0" on 11" x 17")



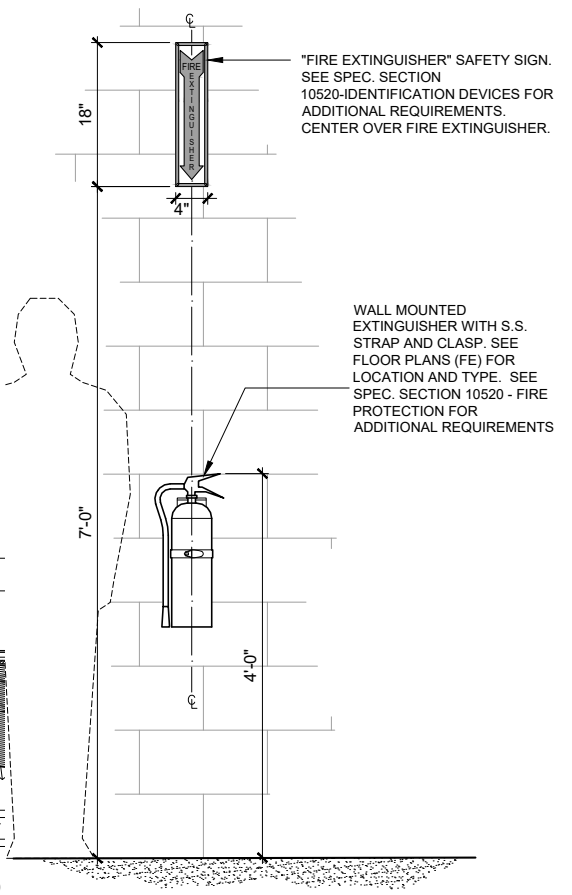
17 | FOUNDATION INSULATION

SCALE: NTS



18 | METAL ROOF PIPE PENETRATION

SCALE: NTS



20 | FIRE EXTINGUISHER AND SIGN

SCALE: 1" = 1'-0" (1/2" = 1'-0" on 11" x 17")

8-11-2022

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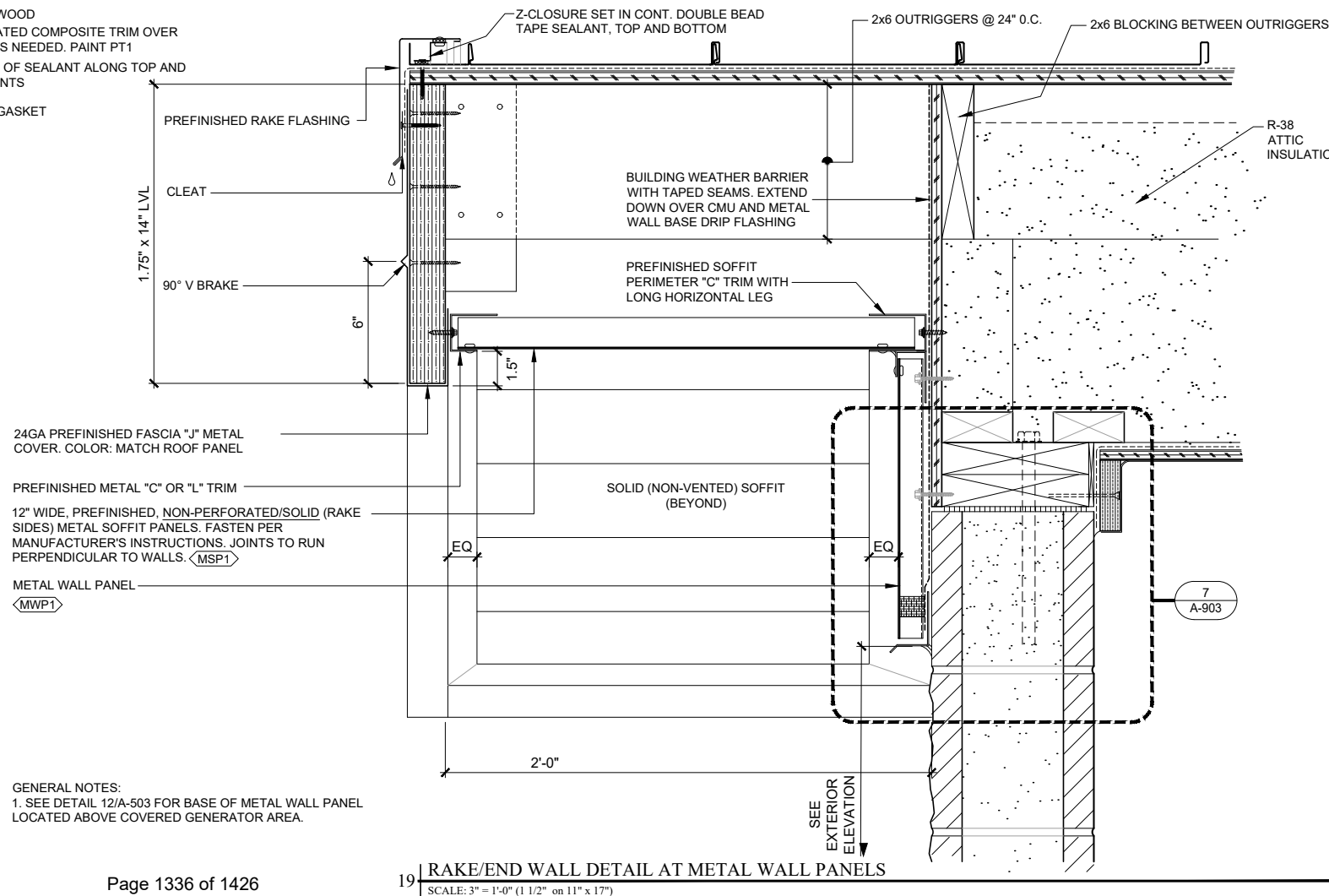
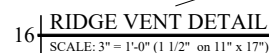
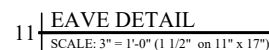
BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

ARCHITECTURAL (A)
GENERAL DETAILS
MISC. DETAILS

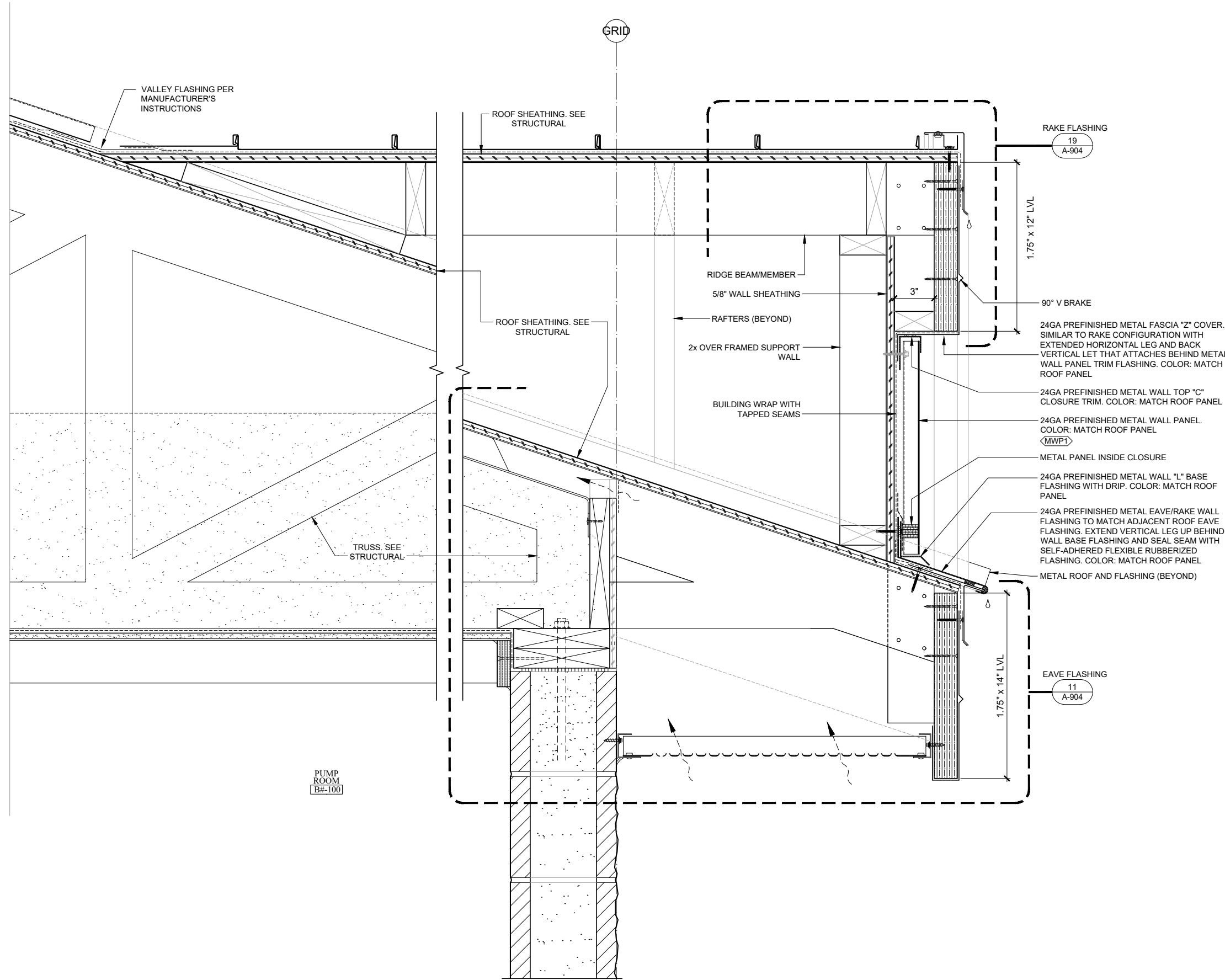
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JUB PROJ. #: 21-18-022
DRAWN BY: JL
DESIGN BY: JL
CHECKED BY: JL
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 4/24/2018

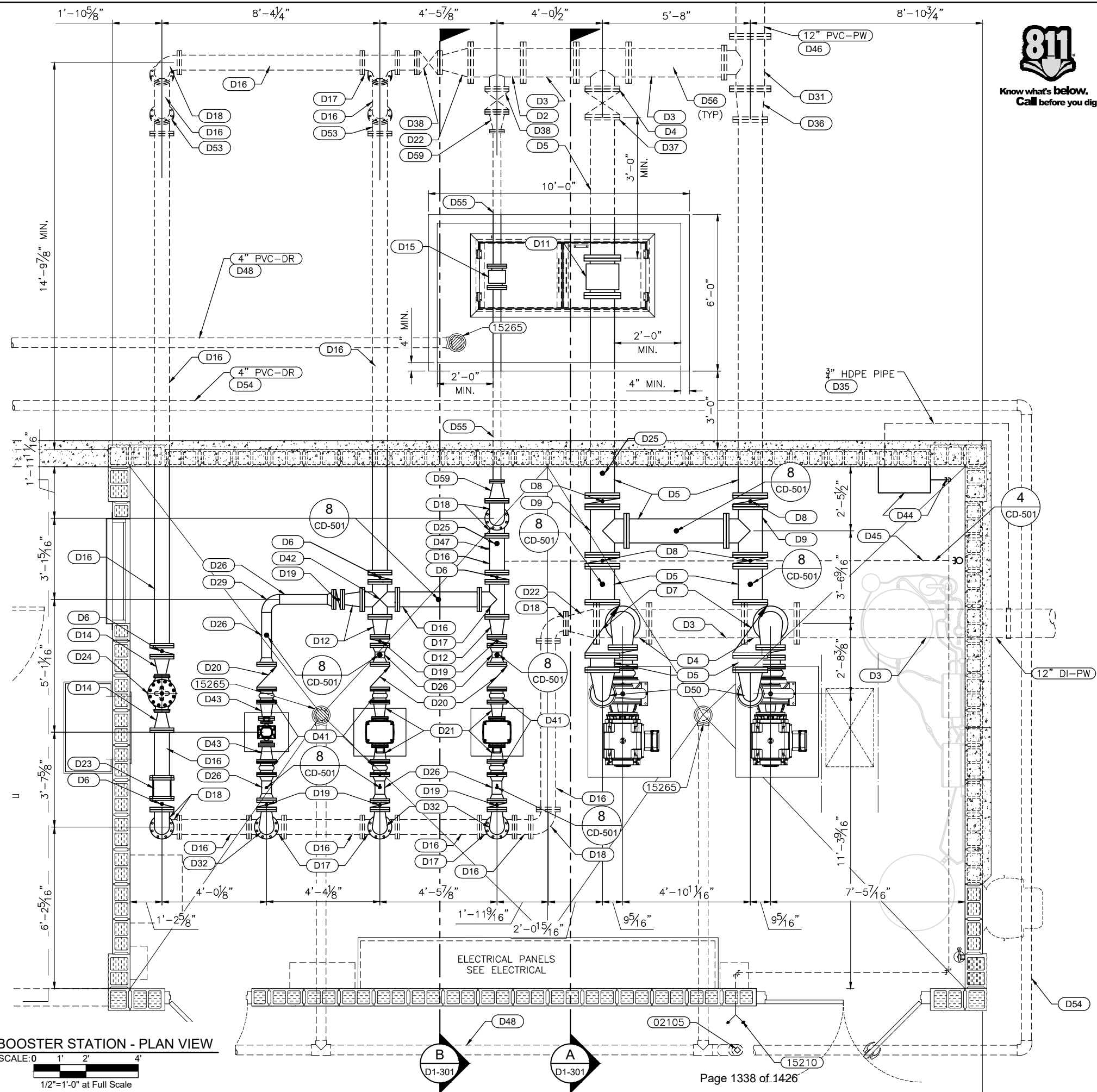
SHEET NUMBER:

A-903



GENERAL NOTES:
1. SEE DETAIL 12/A-503 FOR BASE OF METAL WALL PANEL
LOCATED ABOVE COVERED GENERATOR AREA.





KEYED NOTES:

J-U-B ENGINEERS, INC.

Phone: 208.746.9010

www.jub.com

ORIGINAL SIGNED
BY: MICHELLE L.
JOHNSON
13810
DATE ORIGINAL
SIGNED: 08/12/2022

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BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

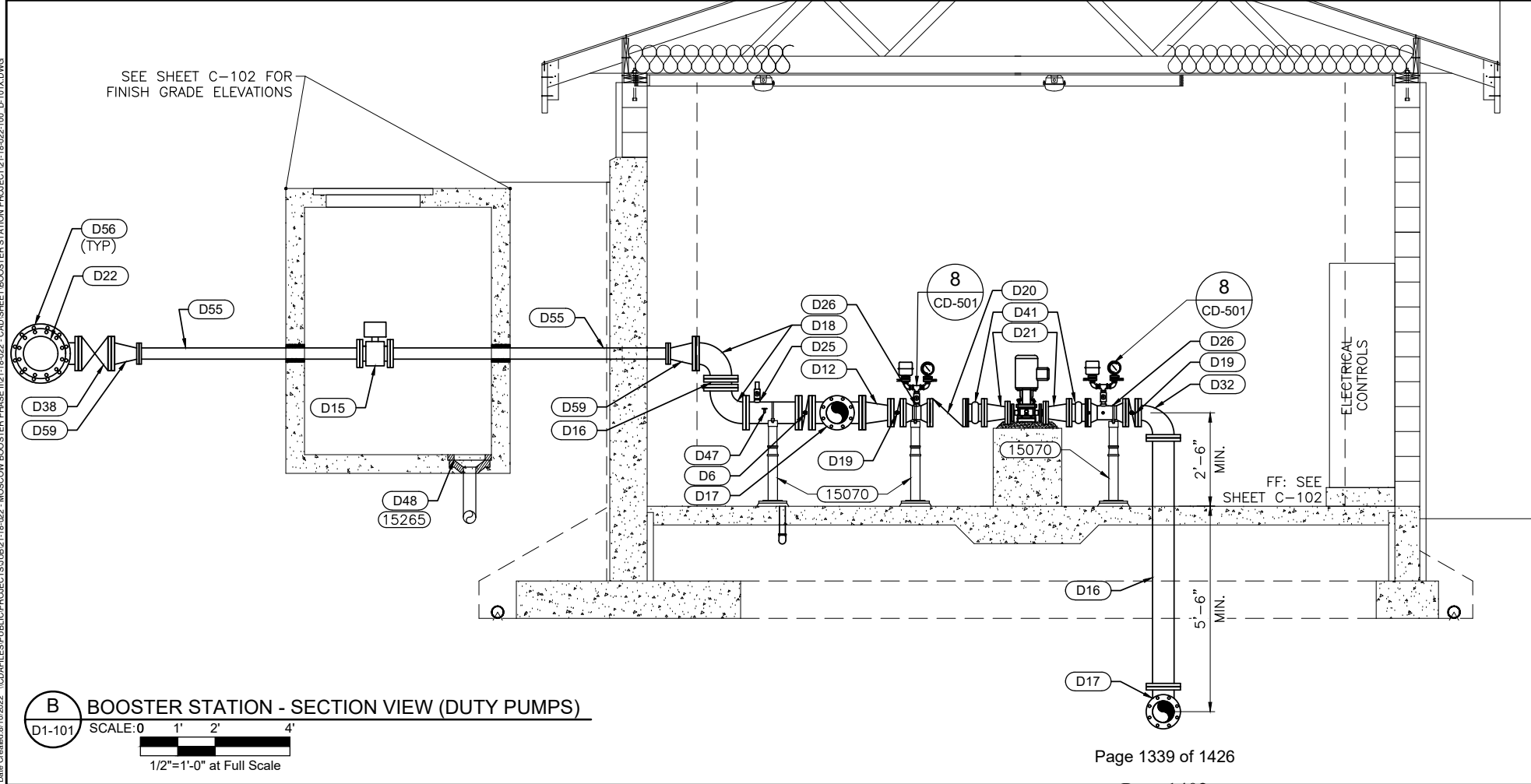
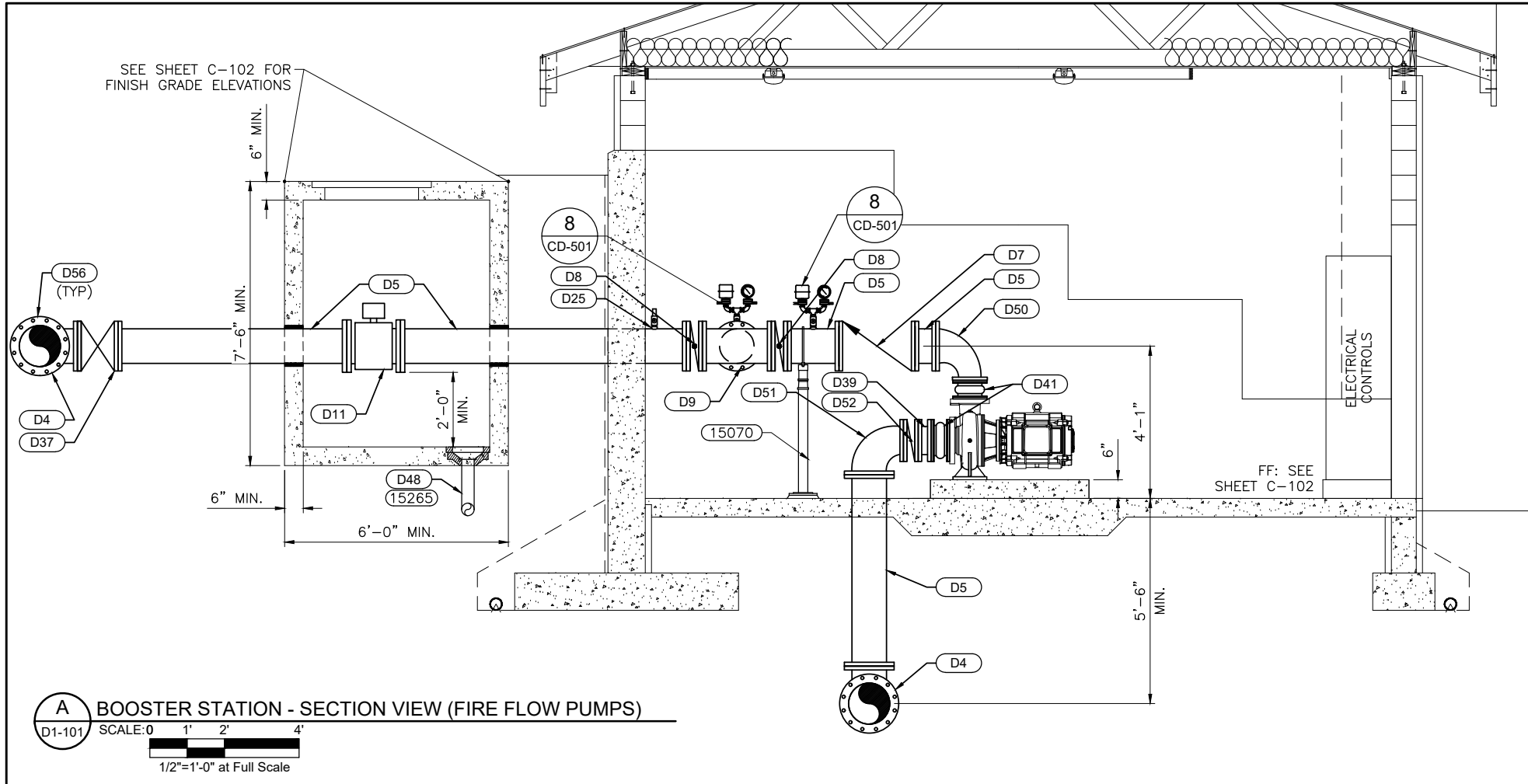
PROCESS MECHANICAL
INDIAN HILLS BOOSTER PUMP STATION
PLAN VIEW

FILE : 21-18-022-100_D-101X
JUB PROJ. # : 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ
 ONE INCH AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/10/2022
SHEET NUMBER:

D1-101

GENERAL NOTES:

Plot Date: 9/10/2022 4:45 PM Plotted By: Ramji Sappapota
Date Created: 10/10/2022 MDATFILES\PUBLIC\PROJECTS\JUB\21-18-022 - MOSCOW BOOSTER STATION PHASE II\21-18-022 - CAD\SHEET\BOOSTER STATION PROJECT\21-18-022-100 D-101X.DWG



KEYED NOTES: (this detail)

D4	12" X 10" DI TEE (FL X FL)
D5	10" DI SPOOL (FL X FL). CONTRACTOR SHALL FIELD VERIFY LENGTH.
D6	6" BUTTERFLY VALVE (BFV-1) (FL X FL)
D7	10" GLOBE STYLE CHECK VALVE
D8	10" BUTTERFLY VALVE (BFV-1) (FL X FL)
D9	10" DI TEE (FL X FL)
D11	10" FLOW METER. SEE ELECTRICAL SPECIFICATIONS.
D12	4" X 6" DI REDUCER (FL X FL)
D15	3" FLOW METER. SEE ELECTRICAL SPECIFICATIONS. CONTRACTOR TO CONFIRM INSTALLED PER MANUFACTURING SPECIFICATIONS.
D16	6" DI SPOOL (FL X FL). CONTRACTOR SHALL FIELD VERIFY LENGTH.
D17	6" DI TEE (FL X FL)
D18	6" DI 90° ELBOW (FL X FL)
D19	4" BUTTERFLY VALVE (BFV-1) (FL X FL)
D20	4" GLOBE STYLE CHECK VALVE
D21	2.5" X 4" REDUCER
D22	12" X 6" DI REDUCER (FL X FL)
D25	THREADED SS NIPPLE ON FACTORY TAP WITH SS BALL VAVLE.
D26	4" STAINLESS STEEL SPOOL
D32	4" X 6" REDUCING 90° ELBOW (FL X FL)
D37	10" GATE VALVE (GV-2) (FL X FL)
D38	6" GATE VALVE (GV-2) (FL X FL)
D39	8" DI SPOOL (FL X FL) CONTRACTOR SHALL FIELD VERIFY LENGTH.
D41	PROCO JOINT (SIZE AS NECESSARY)
D47	1/2" SMOOTH NOSE SAMPLE TAP, SEE DETAIL 9 ON SHEET CD-501.
D48	4" DRAINLINE, SLOPED 2% MINIMUM.
D50	10" X 6" REDUCING 90° ELBOW (FL X FL)
D51	10" X 8" REDUCING 90° ELBOW (FL X FL)
D52	8" BUTTERFLY VALVE (BFV-1) (FL X FL)
D55	3" DI SPOOL, CONTRACTOR TO FIELD VERIFY LENGTH.
D56	CONTRACTOR SHALL PROVIDE FOAM INSULATION PER MANUFACTURERS INSTALLATION REQUIREMENTS, WHERE BURY DEPTH IS LESS THEN 4.5 FEET.
D59	3" X 6" DI REDUCER (FL X FL)

GENERAL NOTES:

- CONTRACTOR SHALL PROVIDE A MINIMUM BURY DEPTH 4.5'.
- CONTRACTOR SHALL PROVIDE THRUST BLOCKS PRE CITY STANDARD 31.
- PIPES SHALL BE FULLY RESTRAINED.
- CONTRACTOR SHALL FIELD VERIFY ALL LENGTHS AND ELEVATIONS.
- INSTALL INSULATING FLANGE AT ALL DUCTILE IRON TO STAINLESS STEEL TRANSITION.



J-U-B ENGINEERS, INC.

J-U-B ENGINEERS, INC.
201 South Jackson Street
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www.jub.com

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BY: MICHELLE L. JOHNSON
13810
DATE ORIGINAL
SIGNED: 08/12/2022

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REVISION	NO.	DESCRIPTION	BY	DATE

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

PROCESS MECHANICAL
INDIAN HILLS BOOSTER PUMP STATION
SECTION VIEWS

FILE: 21-18-022-100_D-101X
JUB PROJ. #: 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/10/2022
SHEET NUMBER:

D1-301



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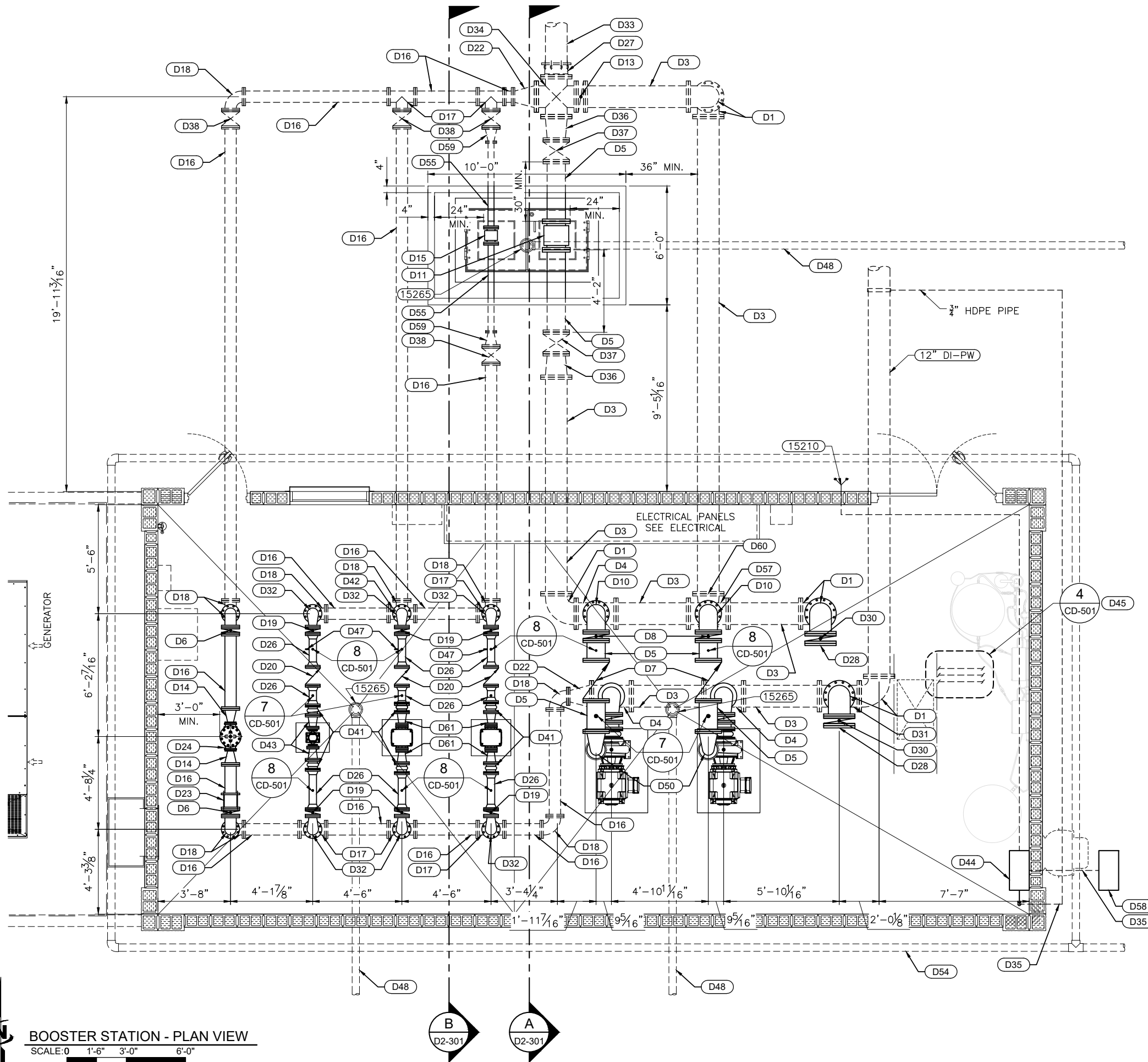
Plot Date: 9/10/2022 4:46 PM Plotted By: Ram Sappap
Date Created: 9/10/2022 10:41:52 AM Project: JUB21-18-022 - MOSCOW BOOSTER PHASE II(2)-18-022 - CAD SHEET BOOSTER STATION PROJECT(2)-18-022-100 D-101X.DWG



BOOSTER STATION - PLAN VIEW

SCALE: 0 1'-6" 3'-0" 6'-0"

3/8"=1'-0" at Full Scale



KEYED NOTES: (this detail)

D1	12" DI 90° ELBOW (FL X FL)
D3	12" DI SPOOL (FL X FL) CONTRACTOR SHALL FIELD VERIFY LENGTH.
D4	12" X 10" DI TEE (FL X FL)
D5	10" DI SPOOL (FL X FL). CONTRACTOR SHALL FIELD VERIFY LENGTH.
D6	6" BUTTERFLY VALVE (BFV-1) (FL X FL)
D7	10" GLOBE STYLE CHECK VALVE
D8	10" BUTTERFLY VALVE (BFV-1) (FL X FL)
D10	10" DI 90° ELBOW (FL X FL). CONTRACTOR TO CONFIRM INSTALLED PER MANUFACTURING SPECIFICATION.
D11	10" FLOW METER. SEE ELECTRICAL SPECIFICATIONS.
D13	12" BUTTERFLY VALVE (BFV-1)
D14	3" X 6" DI REDUCER (FL X FL)
D15	3" FLOW METER. SEE ELECTRICAL SPECIFICATIONS. CONTRACTOR TO CONFIRM INSTALLED PER MANUFACTURING SPECIFICATIONS.
D16	6" DI SPOOL (FL X FL). CONTRACTOR SHALL FIELD VERIFY LENGTH.
D17	6" DI TEE (FL X FL)
D18	6" DI 90° ELBOW (FL X FL)
D19	4" BUTTERFLY VALVE (BFV-1) (FL X FL)
D20	4" GLOBE STYLE CHECK VALVE
D22	12" X 6" DI REDUCER (FL X FL)
D23	6" FLANGE COUPLING ADAPTER WITH RESTRAINING LUGS
D24	3-INCH PRESSURE RELIEF VALVE (PRV-1)
D26	4" STAINLESS STEEL SPOOL
D27	FL X MJ ADAPTER. FULLY RESTRAINED.
D28	12" DI FLANGED CAP
D30	12" BUTTERFLY VALVE (BFV-1) (FL X FL)
D31	12" DI TEE (FL X FL)
D32	4" X 6" REDUCING 90° ELBOW (FL X FL)
D33	12" PVC WATERMAIN
D34	12" DI CROSS (FL X FL)
D35	SLEEVE ALL 3/4" LINES UNDER STEMWALL W/ 1-1/2" CONDUIT WITH SWEEPING ELBOWS. EXTEND CONDUIT 3" ABOVE FF.
D36	10" X 12" DI REDUCER (FL X FL)
D37	10" GATE VALVE (GV-2) (FL X FL)
D38	6" GATE VALVE (GV-2) (FL X FL)
D41	PROCO JOINT (SIZE AS NECESSARY)
D42	6" DI CROSS (FL X FL)
D43	1-1/4" X 4" REDUCER
D44	3/4" WATER SERVICE. SEE DETAIL 3 ON SHEET CD-501. TAP MAIN WITH SST BAND SADDLE TAP & CORP SOP WITH VALVE BOX.
D45	1-1/2" CONDUIT WITH SWEEP ELBOWS. SEE DETAIL 4 ON DRAWING CD-501.
D47	1/2" SMOOTH NOSE SAMPLE TAP, SEE DETAIL 9 ON SHEET CD-501.
D48	4" DRAINLINE, SLOPED 2% MINIMUM.
D50	10" X 6" REDUCING 90° ELBOW (FL X FL)
D54	FOOTING DRAIN PER DETAIL
D55	3" DI SPOOL, CONTRACTOR TO FIELD VERIFY LENGTH.
D57	12" X 10" X 12" X 10" DI CROSS (FL X FL)
D58	APPROXIMATE LOCATION OF IRRIGATION CONTROL BOX. COORDINATE WITH LANDSCAPE SHEETS.
D59	3" X 6" DI REDUCER (FL X FL)
D60	12" X 10" REDUCING 90° ELBOW (FL X FL)
D61	3"x4" REDUCER

GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE A MINIMUM BURY DEPTH 4.5'.
2. CONTRACTOR SHALL PROVIDE THRUST BLOCKS PRE CITY STANDARD 31.
3. PIPES SHALL BE FULLY RESTRAINED.
4. CONTRACTOR SHALL FIELD VERIFY ALL LENGTHS AND ELEVATIONS.
5. INSTALL INSULATING FLANGE AT ALL DUCTILE IRON TO STAINLESS STEEL TRANSITION.

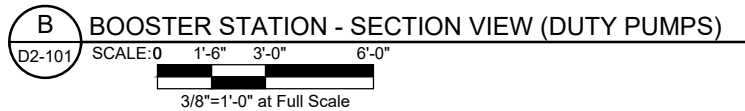
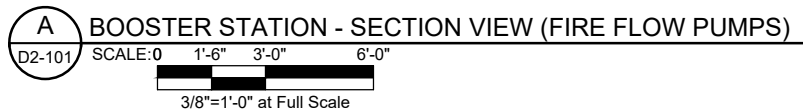
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BOOSTER STATION REPLACEMENTS - PHASE II REBID CITY OF MOSCOW	
PROCESS MECHANICAL PONDEROSA BOOSTER PUMP STATION PLAN VIEW	

FILE: 21-18-022-100_D-101X
JUB PROJ. #: 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/10/2022
SHEET NUMBER:

D2-101





GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE A MINIMUM BURY DEPTH 4.5'.
2. CONTRACTOR SHALL PROVIDE THRUST BLOCKS PRE CITY STANDARD 31.
3. PIPES SHALL BE FULLY RESTRAINED.
4. CONTRACTOR SHALL FIELD VERIFY ALL LENGTHS AND ELEVATIONS.
5. INSTALL INSULATING FLANGE AT ALL DUCTILE IRON TO STAINLESS STEEL TRANSITION.

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13810
DATE ORIGINAL
SIGNED: 08/12/2022

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

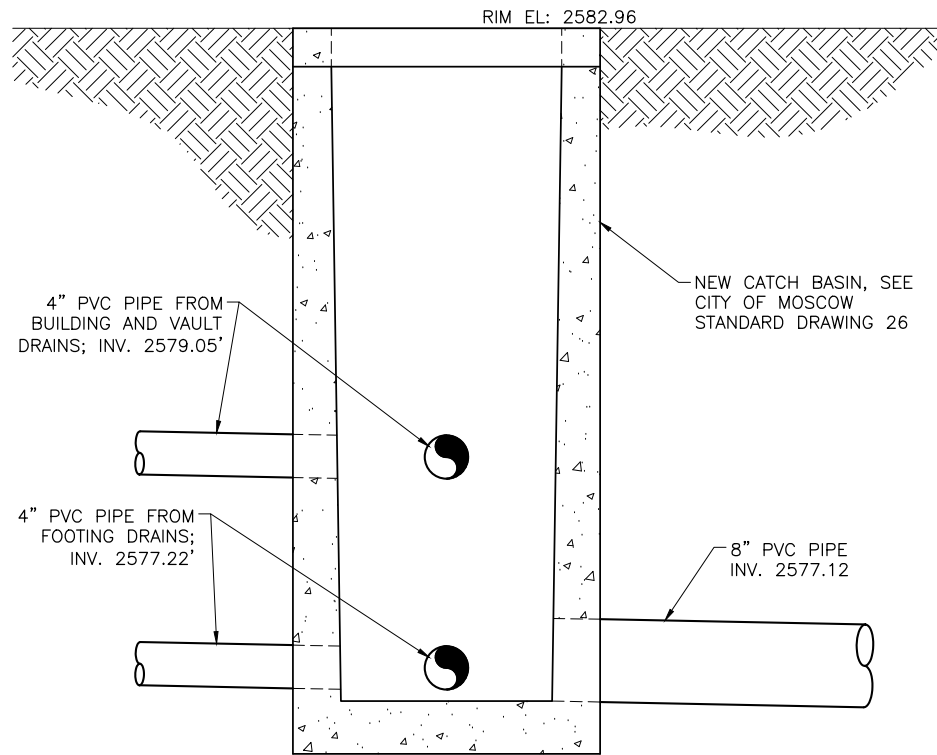
PROCESS MECHANICAL
PONDEROSA BOOSTER PUMP STATION
SECTION VIEWS



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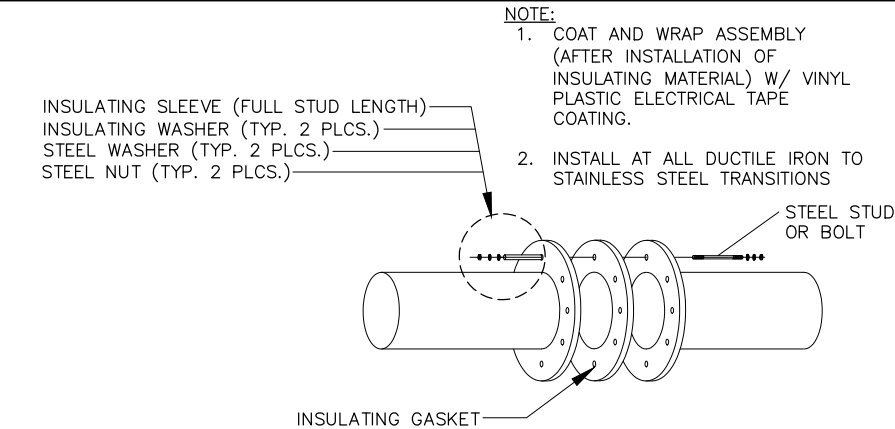
Plot Date: 10/20/2022 4:49 PM Plotted By: Ram Sappapota
Date Created: 2/3/2021 NCADFILES\PUBLIC\PROJECTS\JUB21-18-022 - MOSCOW BOOSTER STATION PROJECT\21-18-022-100 CD-501X.DWG

1 RESERVED
SCALE: NOT TO SCALE



5 CATCH BASIN DETAIL
SCALE: NOT TO SCALE

2 RESERVED
SCALE: NOT TO SCALE



6 INSULATING FLANGE - DETAIL
SCALE: NOT TO SCALE

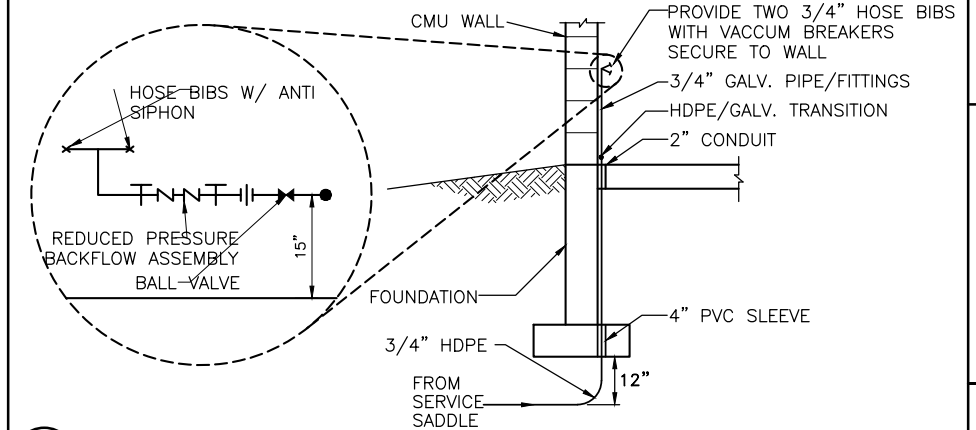
- KEYED NOTES:**
- (N1) COMBINATION AIR/VACUUM OR AIR RELEASE VALVE. PROVIDE ADDITIONAL SUPPORT FOR VALVE BODY.
 - (N2) BALL VALVE, SIZE TO MATCH PIPING
 - (N3) PROCESS PIPE
 - (N4) AIR GAP, MIN. (2) DIAMETERS OR 2"
 - (N5) STAINLESS STEEL PIPE, ROUTE TO NEAREST DRAIN AND SUPPORT AS REQUIRED
 - (N6) THREAD NIPPLE INTO FACTORY TAP.
 - (N7) STAINLESS STEEL SCREEN ON OUTLET, NO. 24 MESH
 - (N8) STAINLESS STEEL NIPPLE, TYP.

7 AIR & VAC VALVE
SCALE: NOT TO SCALE

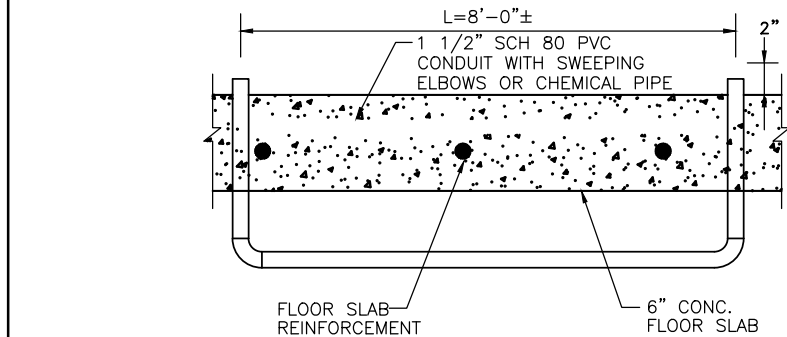
Page 1342 of 1426

Page 1405

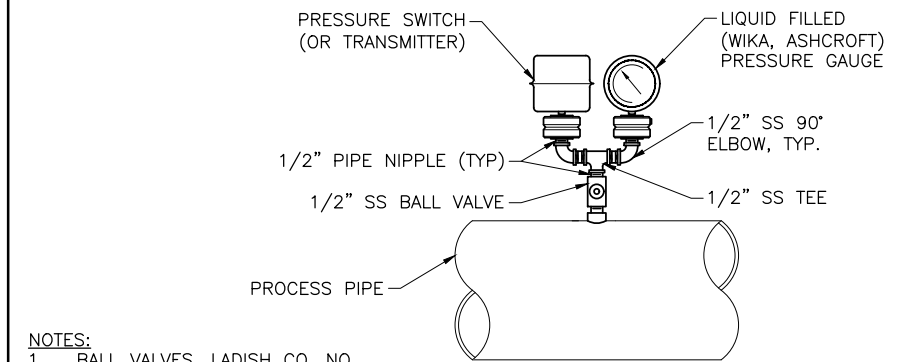
3 3/4" WATER SERVICE
SCALE: NOT TO SCALE



4 1 1/2" FLOOR CONDUIT
SCALE: NOT TO SCALE

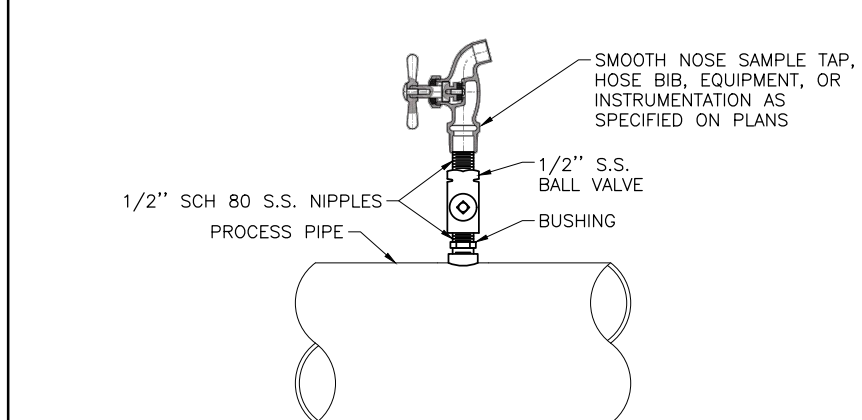


8 PRESSURE GAUGE AND SWITCH ASSEMBLY
SCALE: NOT TO SCALE



- NOTES:**
- 1. BALL VALVES, LADISH CO. NO. 4300, JAMELBURY CORP. TYPE A-36 OR EQUAL

9 HALF INCH SMOOTH NOSED SAMPLE PORT
SCALE: NOT TO SCALE



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BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

CIVIL & PROCESS MECHANICAL DETAILS
PROJECT DETAILS

FILE: 21-18-022-100_CD-501X
JUB PROJ. #: 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/4/2022

SHEET NUMBER:

CD-501

1. THIS DETAIL PERTAINS TO SEPARATION REQUIREMENTS FOR POTABLE WATER AND NON-POTABLE WATER PIPELINES LOCATED WITHIN PUBLIC RIGHTS OF WAY. THE TERM "PIPELINE" APPLIES TO BOTH MAINS AND SERVICES.
2. REFER TO IDAPA 58.01.08.542.07 (IDAH0 RULES FOR PUBLIC DRINKING WATER SYSTEMS) AND IDAPA 58.01.16.430.02.0 (IDAH0 WASTEWATER RULES) FOR ALL SEPARATION REQUIREMENTS.
3. ANY CONDITIONS NOT MEETING THESE TYPICAL SEPARATION REQUIREMENTS MUST HAVE IDEQ SITE SPECIFIC APPROVAL (EG SKEWED CROSSINGS, I.E. NO AT 90°).
4. NON-POTABLE MAINS ARE PROHIBITED FROM BEING LOCATED IN THE SAME TRENCH AS POTABLE MAINS. NEW POTABLE SERVICES ARE PROHIBITED FROM BEING LOCATED IN THE SAME TRENCH AS NON-POTABLE MAINS OR NON-POTABLE SERVICES.
5. PRESSURE SEWAGE MAINS SHALL BE NO CLOSER HORIZONTALLY THAN TEN (10) FEET AND NO CLOSER VERTICALLY THAN EIGHTEEN (18) INCHES FROM POTABLE MAINS.
6. EXISTING POTABLE SERVICES IN RELATION TO NEW NON-POTABLE MAINS, EXISTING NON-POTABLE SERVICES IN RELATION TO NEW POTABLE MAINS, AND EXISTING POTABLE SERVICES IN RELATION TO NEW NON-POTABLE SERVICES SHALL MEET THE REQUIREMENTS OF IDAPA 58.01.16.430.02.0.i.ii., WHERE PRACTICAL, BASED ON COST, CONSTRUCTION FACTORS, AND PUBLIC HEALTH SIGNIFICANCE. IF THE DEPARTMENT (IDEQ) DETERMINES THAT THERE ARE SIGNIFICANT HEALTH CONCERNS WITH THESE SERVICES, SUCH AS WHERE A LARGE EXISTING SERVICE SERVES AN APARTMENT BUILDING OR A SHOPPING CENTER, THEN THE DESIGN SHALL CONFORM WITH IDAPA 58.01.16.430.02.0.i.ii.

- NON-POTABLE MAINS IN RELATION TO POTABLE MAINS:
 - ZONE 13 GREATER THAN TEN (10) FEET SEPARATION: NO ADDITIONAL REQUIREMENTS BASED ON SEPARATION DISTANCE
 - ZONE 23 TEN (10) FEET TO SIX (6) FEET SEPARATION: SEPARATE TRENCHES, WITH BOTTOM OF THE POTABLE MAIN ABOVE THE TOP OF THE NON-POTABLE MAIN, AND NON-POTABLE MAIN CONSTRUCTED WITH POTABLE-WATER CLASS PIPE.
 - ZONE 33 LESS THAN SIX (6) FEET SEPARATION: DESIGN ENGINEER TO SUBMIT DATA TO THE DEPARTMENT FOR REVIEW AND APPROVAL THAT THIS INSTALLATION WILL PROTECT PUBLIC HEALTH AND ENVIRONMENT AND NON-POTABLE MAIN CONSTRUCTED WITH POTABLE-WATER CLASS PIPE.
- NEW NON-POTABLE SERVICES IN RELATION TO POTABLE SERVICES, NEW NON-POTABLE SERVICES IN RELATION TO POTABLE MAINS, AND NEW POTABLE SERVICES IN RELATION TO NON-POTABLE MAINS.
 - ZONE 23 GREATER THAN SIX (6) FEET SEPARATION: NO ADDITIONAL REQUIREMENTS BASED ON SEPARATION DISTANCES.
 - ZONE 33 LESS THAN SIX (6) FEET SEPARATION: DESIGN ENGINEER TO SUBMIT DATA THAT THIS INSTALLATION WILL PROTECT PUBLIC HEALTH AND THE ENVIRONMENT AND NON-POTABLE SERVICE CONSTRUCTED WITH POTABLE WATER CLASS PIPE.

ZONE 1: EIGHTEEN (18) INCHES OR MORE VERTICAL SEPARATION WITH POTABLE PIPELINE ABOVE NON-POTABLE PIPELINE: NON-POTABLE PIPELINE JOINT TO BE AS FAR AS POSSIBLE FROM THE POTABLE WATER PIPELINE.

ZONE 2: EIGHTEEN (18) INCHES OR MORE VERTICAL SEPARATION WITH POTABLE WATER PIPELINE BELOW NON-POTABLE PIPELINE: NON-POTABLE PIPELINE JOINT TO BE AS FAR AS POSSIBLE FROM THE POTABLE WATER PIPELINE, AND NON-POTABLE PIPELINE MUST BE SUPPORTED THROUGH THE CROSSING TO PREVENT SETTLING.

ZONE 3: LESS THAN EIGHTEEN (18) INCHES VERTICAL SEPARATION:

- a) NON-POTABLE PIPELINE JOINT TO BE AS FAR AS POSSIBLE FROM THE POTABLE WATER PIPELINE; AND EITHER
- b) NON-POTABLE PIPELINE CONSTRUCTED WITH POTABLE WATER CLASS PIPE FOR A MINIMUM OF TEN (10) FEET EITHER SIDE OF POTABLE PIPELINE WITH A SINGLE TWENTY (20) FOOT SECTION OF POTABLE WATER CLASS PIPE CENTERED ON THE CROSSING; OR
- c) SLEEVE NON-POTABLE OR POTABLE PIPELINE WITH POTABLE WATER CLASS PIPE FOR TEN (10) FEET EITHER SIDE OF CROSSING. USE OF HYDRAULIC CEMENTITIOUS MATERIALS SUCH AS CONCRETE, CONTROLLED DENSITY FILL, AND CONCRETE SLURRY ENCASEMENT IS NOT ALLOWED AS A SUBSTITUTE FOR SLEEVING.
- d) IF THE POTABLE PIPELINE IS BELOW NON-POTABLE PIPELINE, THE NON-POTABLE PIPELINE MUST ALSO BE SUPPORTED THROUGH THE CROSSING TO PREVENT SETTLING.

02010

- (N1) 5 1/4" LID MARKED "SEWER" FOR SEWER APPLICATIONS, OR MARKED "WATER" FOR WATER APPLICATIONS. PERMANENTLY ATTACH SST VALVE DESIGNATOR TO VALVE BOX INTERIOR WITH SHEET METAL SCREW, AND 3/8" SST CABLE AND CRIMP FERRULES. CABLE LENGTH SHALL ALLOW TAG TO BE PULLED COMPLETELY OUT OF VALVE BOX FOR READING.
- (N2) 24" Ø x 6" CONCRETE COLLAR.
- (N3) COMPACTED GRAVEL.
- (N4) PACK VOID WITH RUBBER SILICONE.
- (N5) NO. 8 AWG. COPPER WIRE FINDER, EXTEND 3' ABOVE FINISH GRADE.
- (N6) VALVE.
- (N7) CAST IRON VALVE BOX RISER, MIN. INTERIOR DIMENSION OF 5", MIN. WALL THICKNESS OF 3/16".
- (N8) CAST IRON VALVE BOX RISER BASE, MIN. INTERIOR DIMENSION OF 5", MIN. WALL THICKNESS OF 3/16".
- (N9) FINISH SURFACE.
- (N10) EXTENSION ROD WITH 2" AWWA OPERATING NUT TO WITHIN 6" OF FINISHED GRADE WITH CENTERING GUIDE PLATE (12" BELOW FINISHED GRADE) FOR VALVES 4' OR DEEPER (MEASURED TO TOP OF VALVE NUT)



1. IF CONSTRUCTED IN AN UNIMPROVED AREA, RING AND COVER SHALL BE 6" ABOVE GRADE.
2. PIPE AND FITTINGS SHALL BE OF THE SAME MATERIAL AS THE GRAVITY DRAIN.
3. IF IN A PAVED AREA, RECESS LID 1/4" BELOW FINISH GRADE.



The diagram illustrates the installation of a dual-wall casing pipe to protect an existing water line. The casing pipe is shown in cross-section, with labels indicating its components: "NON-POTABLE WATER LINE (NPWL)" for the inner pipe and "CASING PIPE AND CALPICO SPACERS PER 02080" for the outer pipe and its supports. The casing pipe is shown with four spacers. The diagram is divided into three horizontal zones: "ZONE 1" at the top, "ZONE 2" at the bottom, and "ZONE 3" in the middle. The vertical distance between the centerlines of the casing pipe in ZONE 1 and ZONE 2 is marked as "18\"". The top of the diagram shows a hatched area representing the ground surface. Two circular symbols, each divided into a white and a black half, are positioned above and below the casing pipe, with lines pointing to them from the labels "POTABLE WATER LINE (PWL)".

POTABLE WATER LINE (PWL)

NON-POTABLE WATER LINE (NPWL)

6 FT.*

10 FT.*

ZONE 1

ZONE 2

ZONE 3

* DISTANCES ARE HORIZONTAL



ORIGINAL SIGNED
BY: MICHELLE L.
JOHNSON
13810
DATE ORIGINAL
SIGNED: 08/12/2022

[illegible]

BOOSTER STATION REPLACEMENTS - PHASE II REBID

CITY OF MOSCOW

CIVIL & PROCESS MECHANICAL DETAILS

STANDARD DETAILS

02010 - 02122

FILE : 21-18-022-100_CD-501X
JUB PROJ. # : 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ

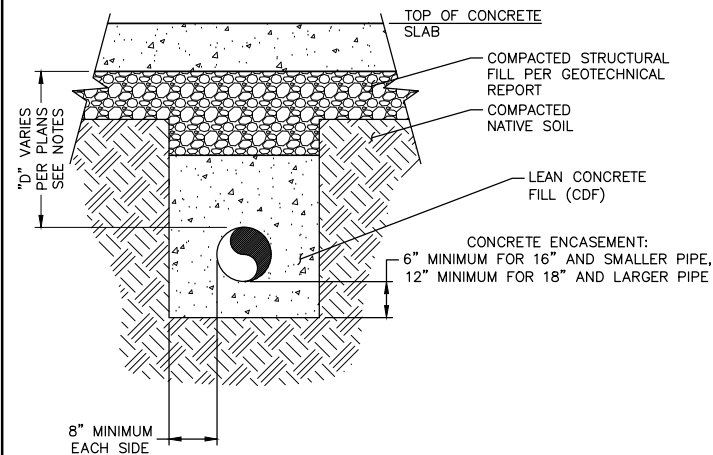

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LAST UPDATED: 8/4/2022

SHEET NUMBER:

CD-502

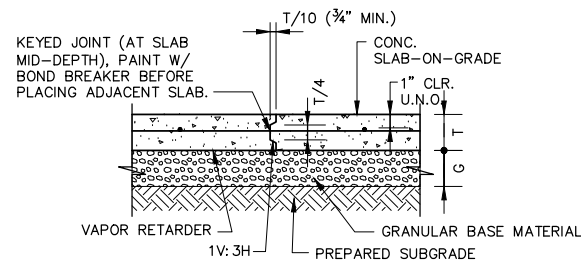
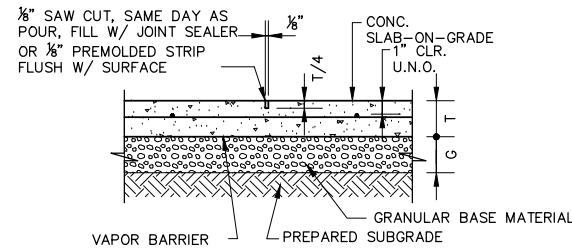
2. EXTEND CONCRETE PIPE ENCASEMENT 12" BEYOND EDGE OF SLAB, TYPICAL.



02135 CONCRETE ENCASEMENT FOR PIPE UNDER SLABS
NOT TO SCALE

NOTES:

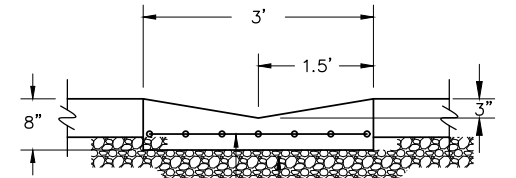
1. REFER TO FOUNDATION PLAN FOR SLAB AND GRANULAR MATERIAL THICKNESS T AND G, AND SLAB REINFORCING REQUIREMENTS. UNLESS NOTED OTHERWISE, MINIMUM SLAB THICKNESS SHALL BE 4" FOR FOOT-TRAFFIC AREAS AND MINIMUM OF 6" FOR VEHICULAR TRAFFIC AREAS; GRANULAR BASE MATERIAL SHALL BE 6" THICK MINIMUM REINFORCING WITH #4 AT 18" O.C.E.W.
2. CONTROL JOINTS SHALL BE 20'-0" O.C. FOR SLABS OR EQUAL TO SIDEWALK WIDTH (50" MAX.) FOR SIDEWALKS.
3. JOINT TYPE USED IS OPTIONAL, UNLESS NOTED OTHERWISE.
4. CUT EVERY OTHER BAR CROSSING CONTROL JOINTS.
5. USE ONLY FOR EXTERIOR SIDEWALKS AND SLABS AS SPECIFICALLY NOTED. SEE STRUCTURAL SHEETS FOR FOUNDATION AND REINFORCED INTERIOR SLABS.
6. ALL AGGREGATE AND SUBGRADE SHALL BE COMPACTED TO 95% OF MAX DRY DENSITY PER ASTM D-1557
7. PROVIDE 1/2" JOINT W/EXPANSION FILLER WHEN ADJACENT TO STRUCTURES.
8. PROVIDE EXPANSION JOINTS WITH FILLER @ 16'-0" O.C. MAXIMUM.



02150 TYPICAL CONCRETE SLAB-ON-GRADE DETAIL
NOT TO SCALE

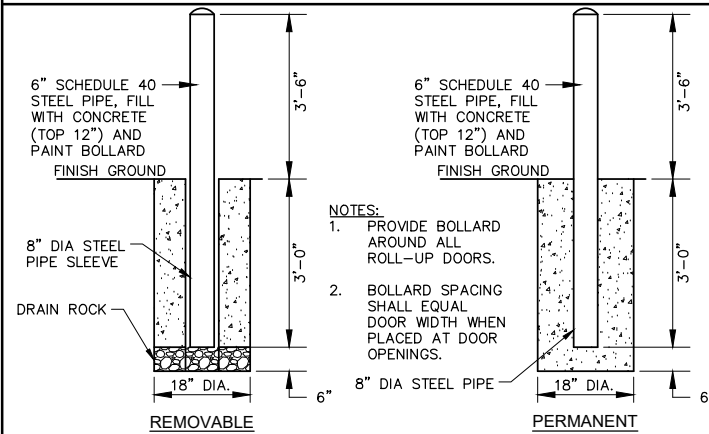
NOTE:

GUTTER SIDE SLOPE TO MATCH ADJACENT SURFACES.



#6 WWF 6"x 6" MESH PLACED— 6" - 1" MINUS AGGREGATE
3-1/4" FROM BOTTOM 2" COMPACTED TO 95% OF MAX
CLEAR FROM EDGES, TYP DRY DENSITY PER ASTM
D-1557

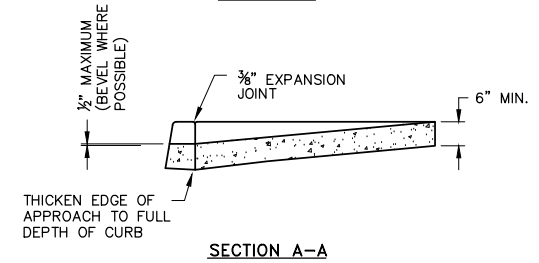
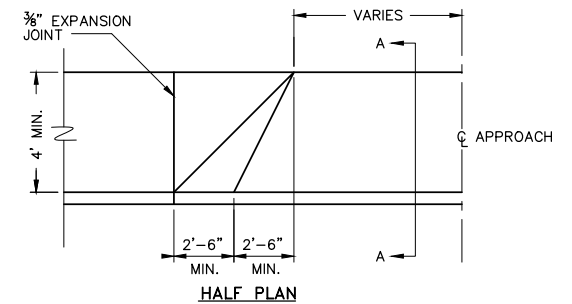
02155 CONCRETE VALLEY GUTTER
NOT TO SCALE



02160 BOLLARD DETAILS
NOT TO SCALE

NOTES:

1. CEMENT CONCRETE APPROACHES SHALL BE CONSTRUCTED OF 2500 PSI MINIMUM AIR-ENTRAINED CONCRETE.
2. CONSTRUCTION JOINTS SHALL BE PLACED AT 15' MAX. SPACING.
3. ALL JOINTS SHALL BE CLEANED AND EDGED.
4. APPROACHES MAY BE POURED INTEGRAL WITH CURB.



02165 CONCRETE APPROACH
NOT TO SCALE



U-B ENGINEERS, INC.

J-U-B ENGINEERS, INC.

1 South Jackson Street
Moscow, ID 83843

www.jub.com

ORIGINAL SIGNED
BY: MICHELLE L.
JOHNSON
13810
DATE ORIGINAL
SIGNED: 08/12/2022

J-J-B SHALL RETAIN ALL COMMON LAW, STATUTORY, COPYRIGHT AND OTHER RESERVED RIGHTS OF THESE DRAWINGS, AND THE SAME SHALL NOT BE REUSED WITHOUT J-J-B'S PRIOR WRITTEN CONSENT. ANY REUSE WITHOUT WRITTEN CONSENT BY J-J-B WILL BE AT CLIENT'S SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO J-J-B.

[illegible]

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

CIVIL & PROCESS MECHANICAL DETAILS
STANDARD DETAILS
02125 - 02165

E : 21-18-022-100_CD-501X
B PROJ. # : 21-18-022
DRAWN BY: WRH
SIGN BY: LTS
CHECKED BY: MLJ

ONE INCH
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY

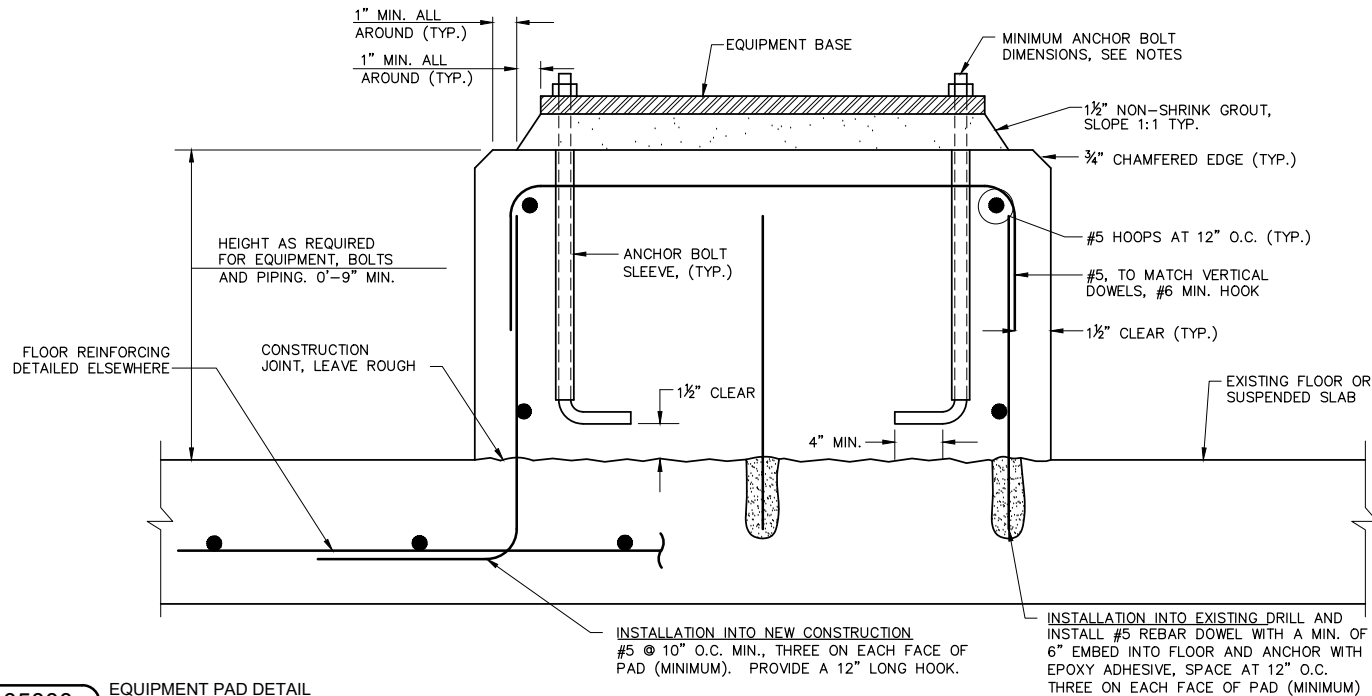
SHEET NUMBER:

CD-503

00000 RESERVED
NOT TO SCALE

NOTES:

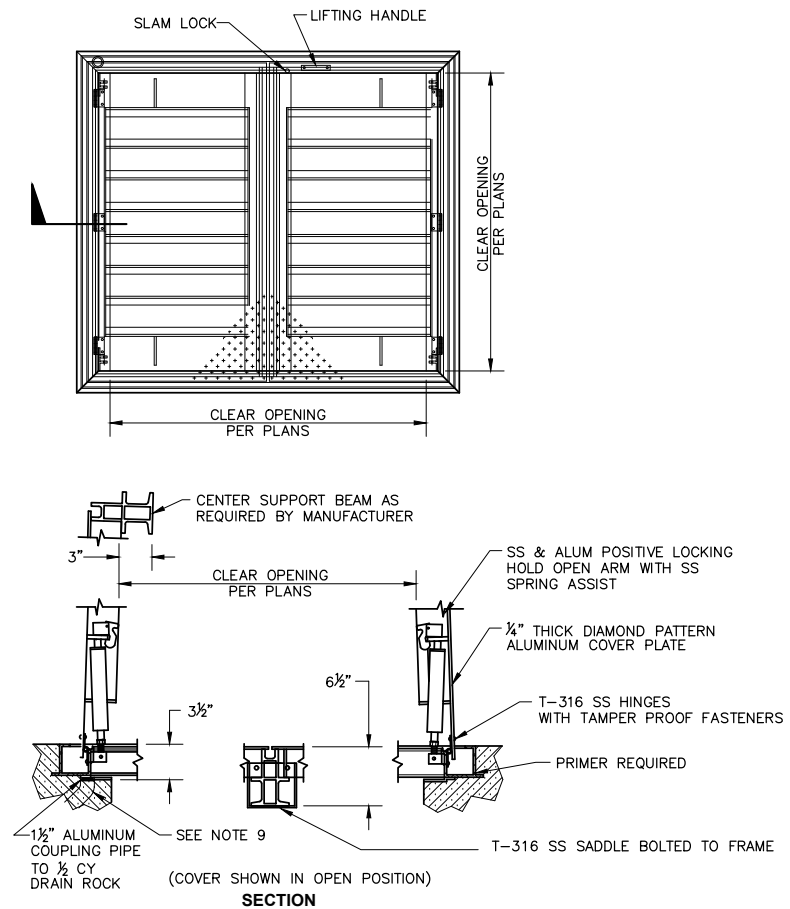
- PAD SIZE SHALL BE MINIMUM INDICATED, AS SHOWN ON THE PLANS, OR AS DETERMINED BY THE EQUIPMENT MANUFACTURER AND APPROVED BY THE ENGINEER.
- THE SIZE, NUMBER, TYPE, LOCATION, THREAD PROJECTION, AND EMBEDMENT OF THE ANCHOR BOLTS SHALL BE DETERMINED BY THE EQUIPMENT MANUFACTURER, AND SHALL BE AS APPROVED BY THE ENGINEER. ANCHOR BOLTS SHALL BE HELD IN POSITION WITH A TEMPLATE WHILE PAD IS BEING POURED.
- ANCHOR BOLT SLEEVES SHALL BE USED TO PROVIDE THE ANCHOR BOLT A MINIMUM MOVEMENT OF $\frac{1}{2}$ " IN ALL DIRECTIONS. THE MINIMUM SLEEVE LENGTH SHALL BE 8 TIMES THE BOLT DIAMETER. SLEEVES SHALL BE FILLED WITH NON-SHRINK GROUT. SLEEVES SHALL HAVE A MINIMUM INTERNAL DIAMETER 1" GREATER THAN BOLT DIAMETER AND A MAXIMUM INTERNAL DIAMETER 3" GREATER THAN ANCHOR BOLT DIAMETER. SLEEVES SHALL BE FILLED WITH NON-SHRINK GROUT.
- EQUIPMENT BASES SHALL BE INSTALLED LEVEL UNLESS SPECIFIED OTHERWISE.
- WEDGES OR SHIMS SHALL BE USED TO SUPPORT THE BASE WHILE THE NON-SHRINK GROUT IS PLACED. TEMPORARY LEVELING NUTS SHALL BE BACKED OFF. IF LEFT IN, THE WEDGES OR SHIMS SHALL NOT BE EXPOSED TO VIEW.



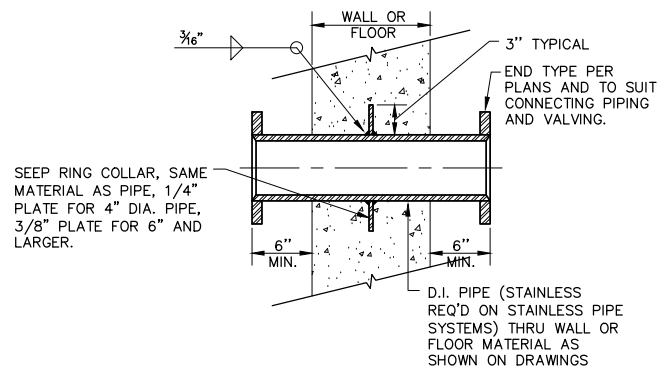
05000 EQUIPMENT PAD DETAIL
NOT TO SCALE

ACCESS DOOR SPECIFICATION:

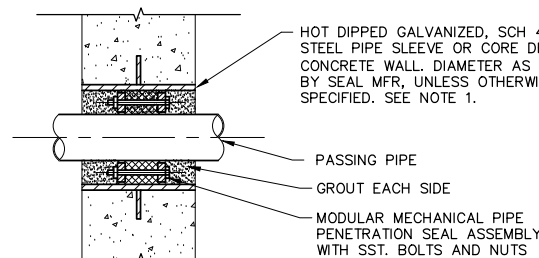
- COVER LEAF (S): $\frac{1}{4}$ " ALUMINUM DIAMOND PLATE (SINGLE OR DOUBLE PER PLANS).
- CHANNEL FRAME: $\frac{1}{4}$ " ALUMINUM WITH CONTINUOUS ANCHOR FLANGE AND A $1\frac{1}{2}$ " DRAINAGE COUPLING LOCATED IN THE FRONT LEFT CORNER OF FRAME.
- LOAD RATING: H-20 TRAFFIC RATED IF IN ROADWAY. 300psf IN PEDESTRIAN TRAFFIC AREA.
- LOCKING SYSTEM: TYPE 316 STAINLESS STEEL SLAM LOCK WITH REMOVABLE KEY.
- COVER EQUIPPED WITH THE FOLLOWING STAINLESS STEEL FEATURES: SPRING ASSISTS, T-316 HEAVY DUTY HINGES, T-316 TAMPER PROOF ATTACHING HARDWARE, AUTOMATIC T-316 HOLD OPEN ARM WITH ALUMINUM LATCH.
- GUARANTEE: ACCESS COVERS SHALL CARRY A LIFETIME GUARANTEE AGAINST DEFECTS IN MATERIAL AND/OR WORKMANSHIP.
- PROVIDE SAFETY ORANGE COLORED SAFETY CABLES EXTENDING FROM COVER TO COVER WHEN OPEN.
- AS MANUFACTURED BY HALLIDAY PRODUCTS, INC. OF ORLANDO, FLORIDA, 800-298-1027, OR APPROVED EQUAL.
- ROUTE PIPE CHANNEL DRAINAGE TO $\frac{1}{2}$ CY DRAIN ROCK WRAPPED IN FILTER FABRIC.



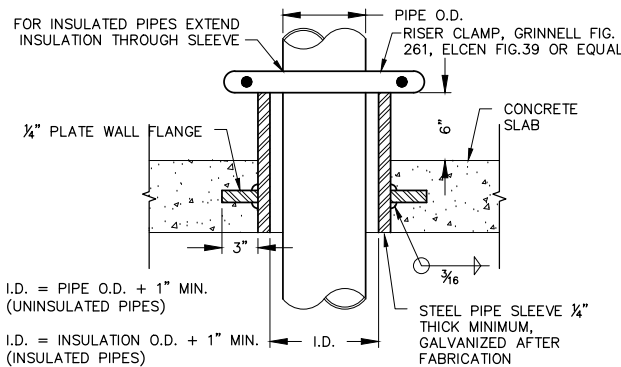
05015 ALUMINUM ACCESS HATCH
NOT TO SCALE



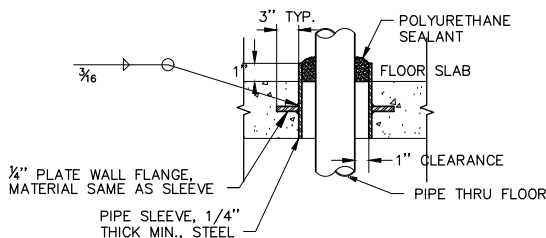
15000 TYPICAL DUCTILE IRON PIPE WALL CRADLE SUPPORT
NOT TO SCALE



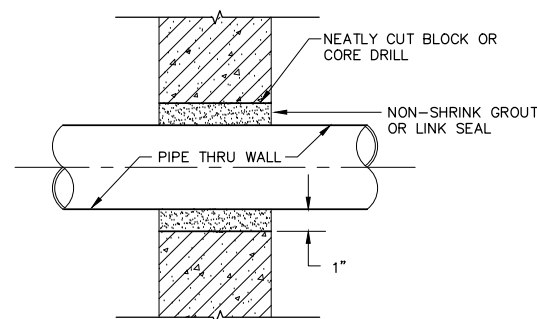
15002 WALL PIPE PENETRATION MECHANICAL SEAL
NOT TO SCALE



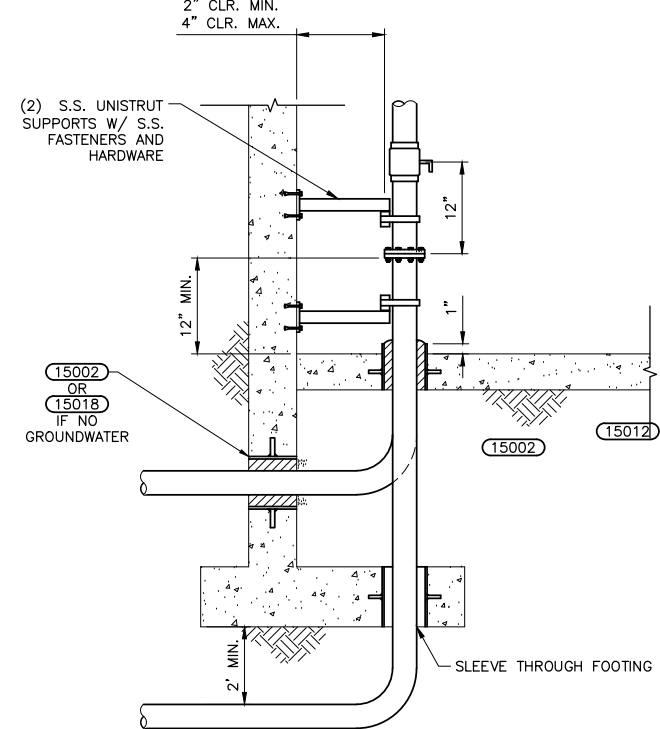
15004 VERTICAL PIPE SUPPORT SLEEVE
NOT TO SCALE



15012 FLOOR PIPE SLEEVE
NOT TO SCALE



15018 PIPE PENETRATION OF EXISTING MASONRY WALL
NOT TO SCALE



15006 HDPE NPW PIPE TRANSITION THROUGH FLOOR SLAB
NOT TO SCALE



J-U-B ENGINEERS, INC.

J-U-B ENGINEERS, INC.
201 South Jackson Street
Moscow, ID 83843
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www.jub.com

ORIGINAL SIGNED
BY: MICHELLE L. JOHNSON
13810
DATE ORIGINAL
SIGNED: 08/12/2022

REUSE OF DRAWINGS		REVISION		BY		DATE	
JUB SHALL RETAIN ALL COMMON LAW, STATUTORY, COPYRIGHT AND OTHER RIGHTS IN THIS DESIGN AND DRAWING. NO PART OF THIS DESIGN OR DRAWING SHALL BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN CONSENT OF JUB. ANY REUSE WITHOUT WRITTEN CONSENT BY JUB WILL BE AT CLIENT'S SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO JUB.		NO.		DESCRIPTION		BY	
						APR	

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW
CIVIL & PROCESS MECHANICAL DETAILS
STANDARD DETAILS
05000 - 15006

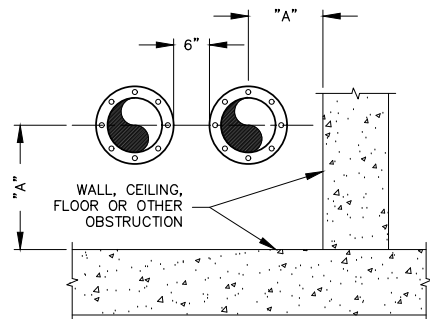
FILE: 21-18-022-100_CD-501X
JUB PROJ. #: 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/4/2022
SHEET NUMBER:

CD-505

1. IT IS RECOMMENDED THAT CONTINUOUS SUPPORT BE USED WHEN INDIVIDUAL SUPPORT SPACING BECOMES ECONOMICALLY PROHIBITIVE.
2. PIPE SUPPORT DATA FOR PIPES NOT LISTED SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
3. PROVIDE ADDITIONAL SUPPORTS AT ALL PIPE BENDS, TEES, PLUGS AND ON EACH SIDE OF ALL FLEXIBLE PIPE JOINTS (2/JOINT).
4. THE CHART DOES NOT INCLUDE CONCENTRATED LOAD SUPPORTS. PROVIDE ADDITIONAL SUPPORTS AT ALL VALVES, CHECKS, CONTROL VALVES AND OTHER CONCENTRATED LOAD AREAS.

		PIPE SIZE (INCHES)																							
		TYPE OF PIPE	½	¾	1	1½	2	2½	3	3½	4	6	8	10	12	14	16	18	20	24	30				
MAXIMUM SPAN (FEET)	STEEL OR DUCTILE IRON	5	6	7	9	10	11	12	13	14	17	19	22	23	25	27	28	30	30	30					
	PVC SCHEDULE 40	4½	4½	5	5½	5½	6½	7	7	7	8	8½	9	10½											
	PVC SCHEDULE 80	4½	5	5½	6	6½	7½	7½	8	8½	9½	10½													
	COPPER & BRASS TUBING	5	6	6	8	9	10	10	11	12															
	HANGER DIAMETER FOR GIVEN PIPE SIZE (INCHES)																								
	HANGER ROD	¾	¾	¾	¾	¾	½	½	½	¾	¾	¾	1	1¼	1¼	1¼	1¼	1½	1½	2					

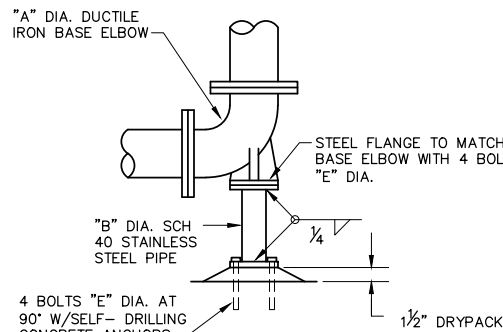
15050



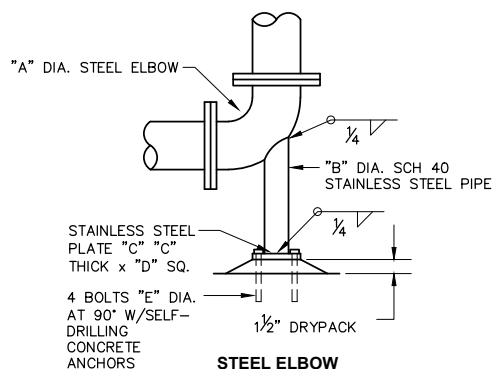
1. MINIMUM OBSTRUCTION CLEARANCE PER TABLE, UNLESS SHOWN OTHERWISE ON PLANS.

TYPICAL MINIMUM PIPE CLEARANCES			
PIPE Ø (IN.)	"A" (IN.)	FLANGE Ø (IN.)	BOLTS PER FLANGE
4"	10½	9	8
6	11½	11	8
8	12¾	13½	8
10	14	16	12
12	15½	19	12
14	16½	21	12
16	17¾	23½	16
18	18½	25	16
20	19¾	27½	20
24	22	32	20
30	25½	38¾	28
36	29	46	32

15065 TYPICAL PIPE
NOT TO SCALE



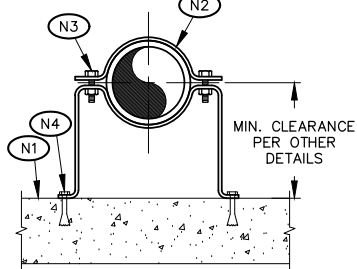
DUCTILE IRON ELBOW



STEEL ELBOW

ELBOW "A" DIA.	DIMENSIONS IN INCHES			
	"B" DIA.	"C" THICK	"D" SQ.	"E" DIA.
4	2	$\frac{3}{8}$	6	$\frac{5}{8}$
6	$2\frac{1}{2}$	$\frac{3}{8}$	7	$\frac{5}{8}$
8	4	$\frac{1}{2}$	9	$\frac{5}{8}$
10	4	$\frac{1}{2}$	9	$\frac{5}{8}$
12	6	$\frac{1}{2}$	11	$\frac{3}{4}$
14	6	$\frac{1}{2}$	11	$\frac{3}{4}$
16	6	$\frac{1}{2}$	11	$\frac{3}{4}$
18	8	$\frac{1}{2}$	$13\frac{1}{2}$	$\frac{3}{4}$
20	8	$\frac{1}{2}$	$13\frac{1}{2}$	$\frac{3}{4}$
24	8	$\frac{1}{2}$	$13\frac{1}{2}$	$\frac{3}{4}$
30	10	$\frac{3}{4}$	16	$\frac{7}{8}$
36	12	$\frac{3}{4}$	19	$\frac{7}{8}$
42	16	$\frac{3}{4}$	$23\frac{1}{2}$	1
48	18	$\frac{3}{4}$	25	$1\frac{1}{8}$

- (N1) CONCRETE FLOOR OR WALL
- (N2) $\frac{3}{8}$ "x3" STAINLESS STEEL FLAT BAR
FOR 6"Ø OR GREATER PIPES, $\frac{1}{2}$ "x2"
STAINLESS STEEL FLAT BAR FOR
SMALLER PIPES.
- (N3) $\frac{1}{2}$ "Ø STAINLESS STEEL BOLTS FOR
6"Ø PIPE AND LARGER; $\frac{3}{8}$ "
STAINLESS STEEL BOLTS FOR
SMALLER PIPES.
- (N4) $\frac{1}{2}$ "Ø STAINLESS STEEL EXPANSION
ANCHORS WITH 4" MINIMUM
EMBEDMENT.

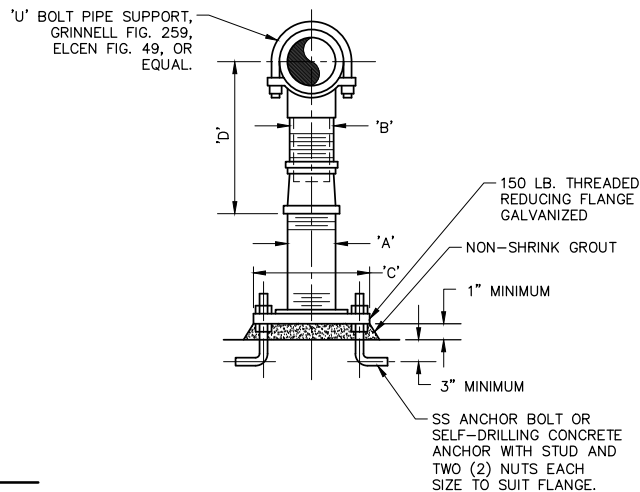


15100

15075

PIPE SIZE	A	B	C	D MINIMUM	D MAXIMUM
2½	2½	1½	9	8	11½
3	2½	1½	9	8½	11¾
3½	2½	1½	9	8½	12
4	3	*2½	9	10¼	14
6	3	*2½	9	11½	15¼
8	3	*2½	9	13½	16½
10	3	*2½	9	14½	18¼
12	3	*2½	9	15½	19¾
14	4	3	11	18½	20¾
16	4	3	11	19½	22¼
18	6	3½	13½	21¼	24
20	6	3½	13½	23¼	25½
24	6	4	13½	26½	28¼
30	6	4	13½	29¾	31½
32	6	4	13½	30¾	32¾
36	6	4	13½	32¾	34¾

* SEE MFR.

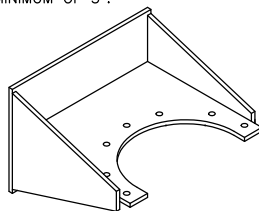


15070 PIPE SUPPO
NOT TO SCALE

NOMINAL PIPE DIA. Dp, in.	BRACKET WIDTH W, in.	BRACKET HEIGHT H, in.	PLATE THICKNESS Tp, in.	FILLET WELD SIZE Tw, in.	ANCHOR RODS	
					DIAMETER Ad, in.	EMBEDMENT E, in.
4	10.50	10.50	0.375	0.250	0.625	5.00
6	12.50	10.50	0.375	0.250	0.625	5.00
8	14.75	13.00	0.500	0.250	0.750	6.625
10	17.25	13.00	0.500	0.250	0.750	6.625
12	20.00	14.50	0.500	0.250	0.875	7.50
14	21.75	14.50	0.625	0.3125	0.875	7.50
16	24.25	15.50	0.625	0.3125	1.000	8.25
18	25.75	15.50	0.625	0.3125	1.000	8.25
20	28.00	18.00	0.625	0.3125	1.000	8.25
24	32.00	21.00	0.625	0.3125	1.000	8.25

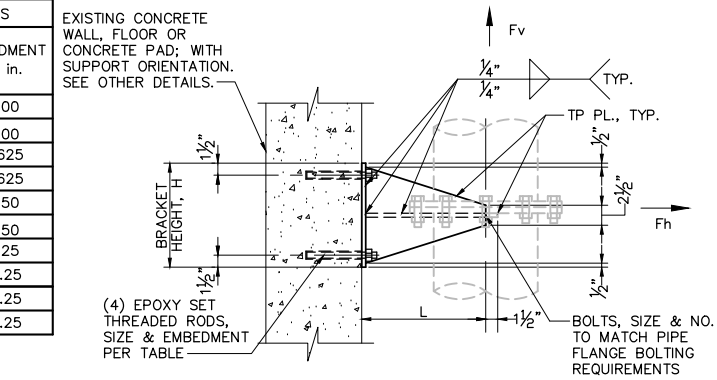
ANCHOR SYSTEM: HILTI HIT HY 150 ADHESIVE SYSTEM,
OR APPROVED EQUIVALENT

1. REFER TO TABLE FOR ADDITIONAL REQUIREMENTS ANCHOR
2. RODS TO BE SET UTILIZING THE HILTI HIT HY 150 SYSTEM.
3. D_o , D_b , AND RELATED ITEMS SHALL MATCH PIPE FLANGE AND BOLTING REQUIREMENTS.
4. F_v AND F_h DENOTE VERTICAL AND HORIZONTAL FORCES, RESPECTIVELY.
5. L = MINIMUM OF 3".

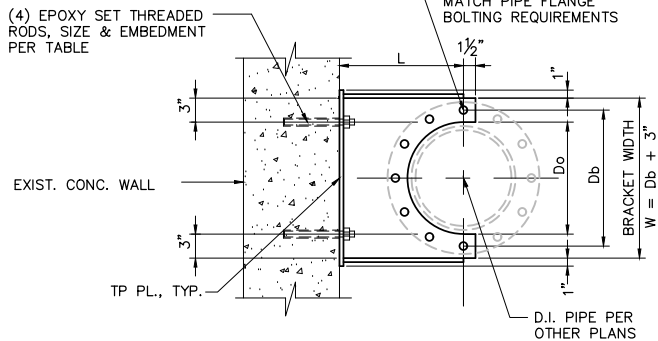


ISOMETRIC VIEW

Page 13475 of 3426



ELEVATION VIEW



PLAN VIEW

J-U-B ENGINEERS, INC.

1 South Jackson Street
Moscow, ID 83843

Phone: 208.746.9010
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ORIGINAL SIGNED
BY: MICHELLE L.
JOHNSON
13810
DATE ORIGINAL
SIGNED: 08/12/2022

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BOOSTER STATION REPLACEMENTS - PHASE II REBID

CITY OF MOSCOW

LESS MECHANICAL DETAILS
STANDARD DETAILS
15050 - 15135

FILE : 21-18-022-100_CD-501X
JUB PROJ. # : 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ


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INCH. SCALE ACCORDINGLY

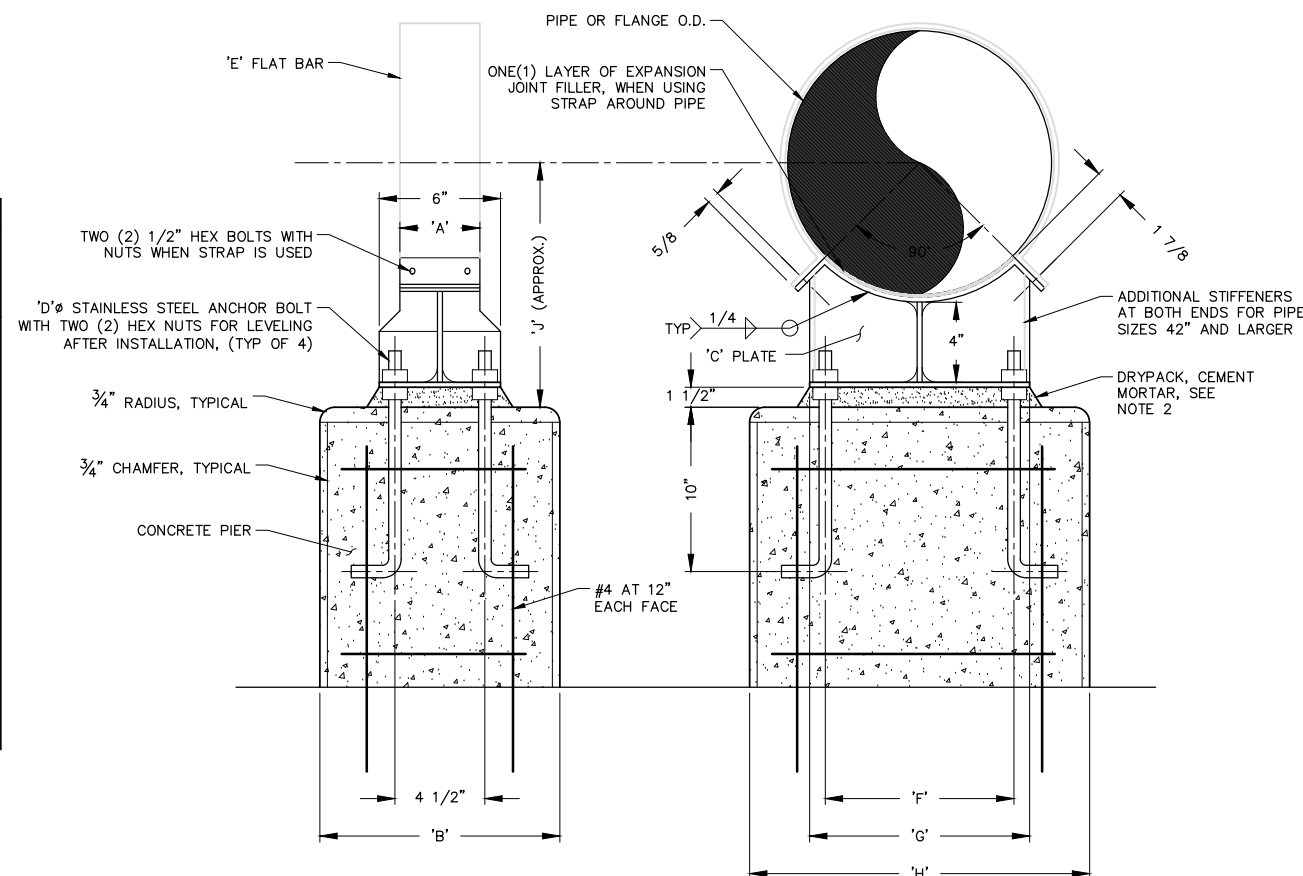
LAST UPDATED: 8/4/2022

SHEET NUMBER:

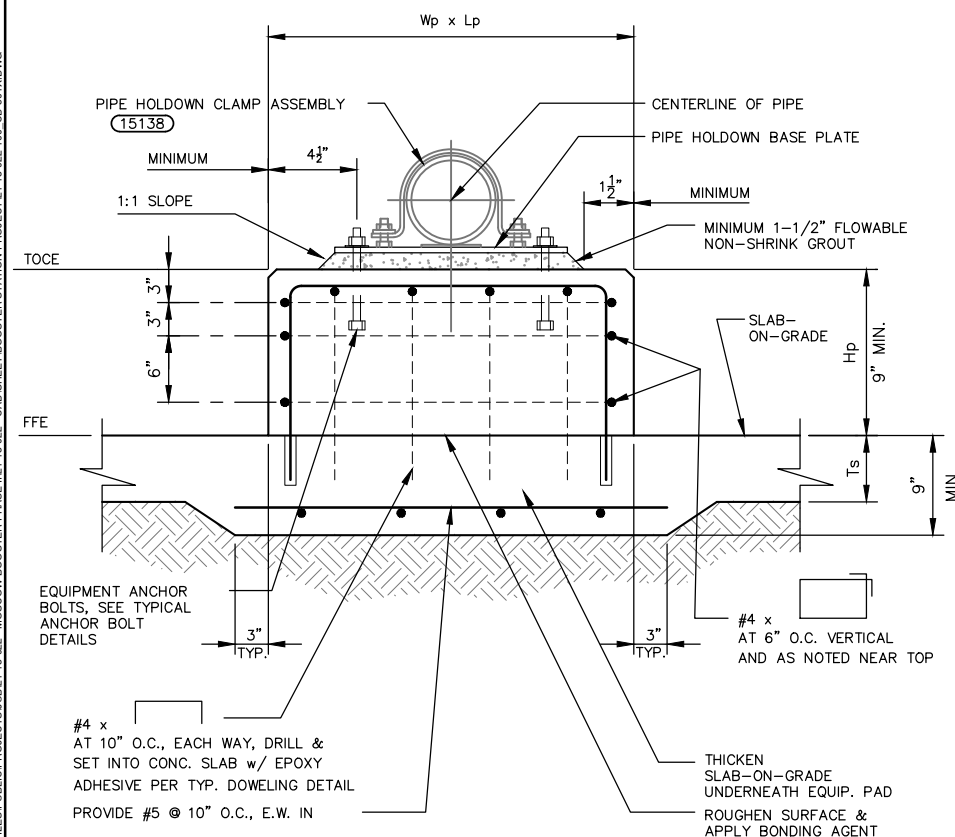
CD-506

1. WHEN SUPPORTING PIPE AND FLANGE ALTERNATELY ON THE SAME LINE CONCRETE PIERS FOR PIPE SUPPORTS SHALL ALL HAVE THE SAME DIMENSION 'H' FOR FLANGE SUPPORT.
2. WHERE DIFFERENTIAL SETTLEMENT IS LIKELY TO OCCUR, OMIT AS DIRECTED BY THE ENGINEER.
3. HOT DIP GALVANIZE ENTIRE ASSEMBLY AFTER FABRICATION.

DIMENSIONS IN INCHES													
NOMINAL PIPE SIZE						SUPPORTING							
						PIPE				FLANGE			
	A	B	C	D	E	F	G	H	J	F	G	H	J
4 & 6	4	12	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{4}$	$4\frac{1}{2}$	6	12	10	$6\frac{1}{2}$	9	16	13
8	4	12	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{4}$	5	8	13	11	$7\frac{1}{2}$	9	16	14
10	4	12	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{4}$	6	9	15	12	9	13	18	15
12	4	12	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{4}$	7	11	17	13	10	15	20	16
14	4	12	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{4}$	8	12	17	14	11	16	21	17
16	4	12	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{4}$	9	13	19	15	12	18	24	18
18	4	12	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{4}$	10	14	20	16	13	19	24	19
20	5	12	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{3}{8}$	10	15	21	17	15	21	26	21
22	5	12	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{3}{8}$	12	18	24	18	16	23	28	22
24	5	12	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{3}{8}$	13	19	24	19	16	24	30	23
26	5	12	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{8}$	14	21	27	20	18	26	32	24
30	5	12	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{8}$	15	23	28	22	20	29	34	26
34	5	15	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{8}$	18	26	32	24	22	33	39	29
36	6	15	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{8}$	19	27	32	25	24	34	40	30
42	6	18	$\frac{1}{2}$	1	$\frac{3}{8}$	21	31	36	28	27	39	45	33



15136 PEDESTAL WITH OR WITHOUT STRAP
NOT TO SCALE

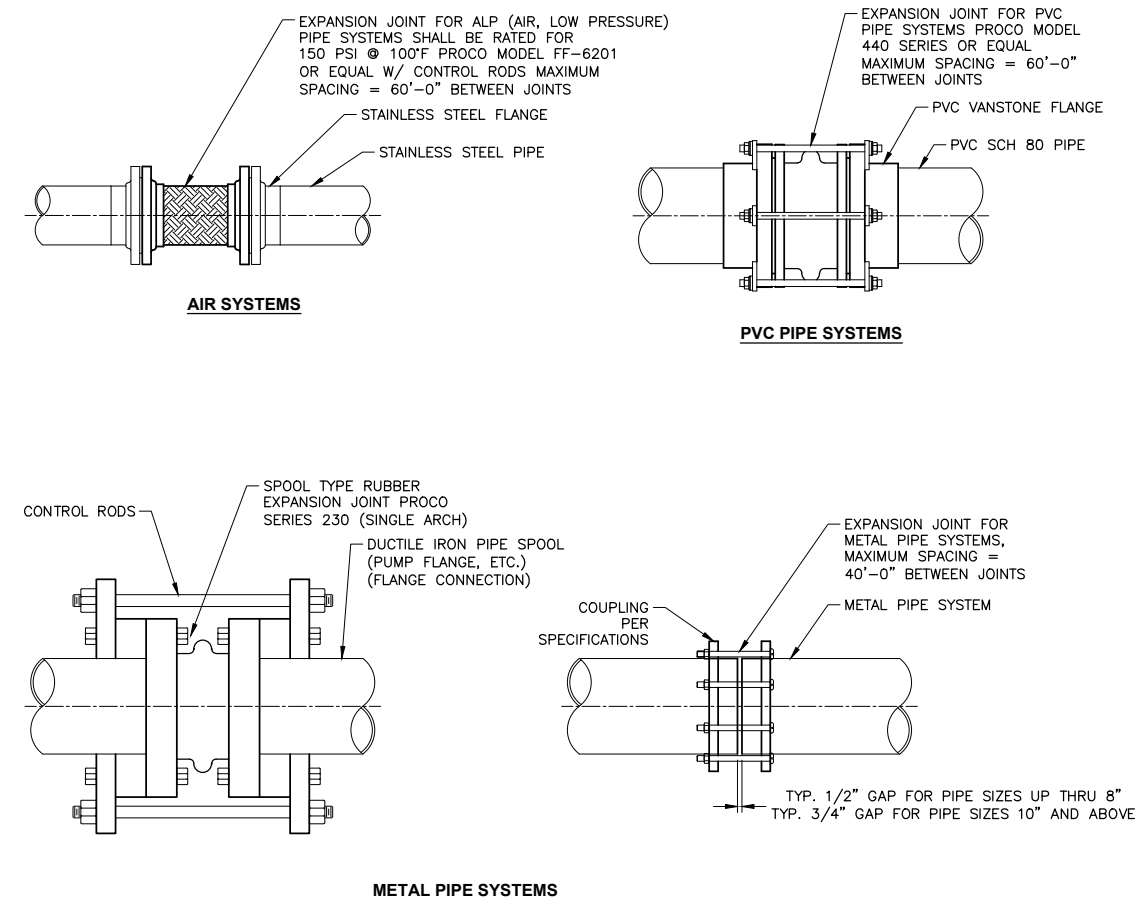


15137 TYPE 2 CONCRETE PIPE SUPPORT
NOT TO SCALE

DIMENSIONS IN INCHES				
NOMINAL PIPE SIZE I.D.	BASE PLATE		CONCRETE BASE DIMENSIONS	
	WIDTH	LENGTH	WIDTH	LENGTH
8"	4"	21.50"	12"	2.0"
10"	4"	25.50"	12"	32.0"
12"	4"	27.50"	12"	34.0"
14"	9"	29.50"	15"	36.0"
16"	9"	31.50"	15"	38.0"
18"	9"	33.50"	15"	40.0"
20"	9"	35.50"	18"	42.0"
24"	9"	39.50"	18"	46.0"
30"	9"	45.50"	20"	52.0"
36"	9"	51.50"	24"	58.0"

1. PROVIDE 6" MIN. COMPACTED CRUSHED BASE MATERIAL BELOW EQUIPMENT PADS.
2. SEE OTHER PLANS & DETAILS FOR SLAB-ON-GRADE REQUIREMENTS.
3. COORDINATE PAD HEIGHT H_p WITH THE CIVIL PLANS & EQUIPMENT SUPPLIER.
4. COORDINATE PAD DIMENSIONS D_p , W_p & L_p WITH EQUIPMENT SUPPLIER.
5. COORDINATE ANCHOR BOLTS WITH THE EQUIPMENT SUPPLIER

1. PROVIDE 6" MIN. COMPACTED CRUSHED BASE MATERIAL BELOW EQUIPMENT PADS.
2. SEE OTHER PLANS & DETAILS FOR SLAB-ON-GRADE REQUIREMENTS.
3. COORDINATE PAD HEIGHT H_p WITH THE CIVIL PLANS & EQUIPMENT SUPPLIER.
4. COORDINATE PAD DIMENSIONS D_p , W_p & L_p WITH EQUIPMENT SUPPLIER.
5. COORDINATE ANCHOR BOLTS WITH THE EQUIPMENT SUPPLIER

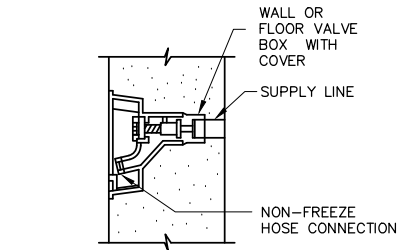


15140 PIPE EXPANSION JOINTS
NOT TO SCALE

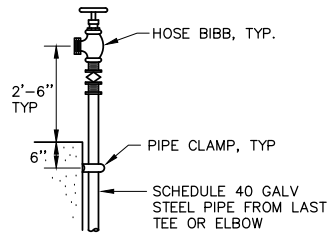
Plot Date: 9/10/2022 4:50 PM Plotted By: Rami Sappopo
Date Created: 2/3/2021 MGAFILES\PUBLIC\PROJECTS\JUB21-18-022 - MOSCOW BOOSTER PHASE II\21-18-022 - CAD\Sheet\BOOSTER STATION PROJECT\21-18-022-100_CD-501X.DWG

NOTES:

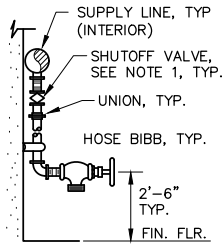
1. ALL HOSE BIBBS TO BE CONTROLLED BY INDIVIDUAL SHUTOFF VALVES (BALL OR PLUG VALVES), EXCEPT WHERE INDIVIDUALLY CONTROLLED BRANCH MAIN SERVES HOSE BIBBS ONLY.
2. FOR SIZE & LOCATION SEE DRAWINGS.
3. PROVIDE WARNING SIGN, WHEN USED FOR NON-POTABLE OR UTILITY WATER. REFER TO STANDARD DETAIL.
4. SEE SPECS FOR ADDITIONAL DESCRIPTION OF HOSE BIBBS.
5. SUBSTITUTE 1½" GLOBE VALVE WITH HOSE ADAPTER FOR 1½" HOSE BIBBS.
6. PROVIDE STAINLESS STEEL SUPPORTS AND FASTENERS AS NECESSARY.



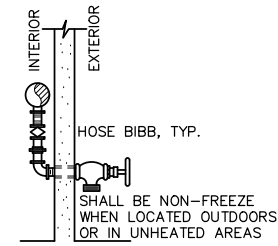
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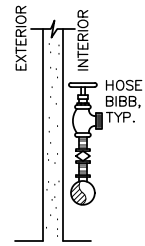
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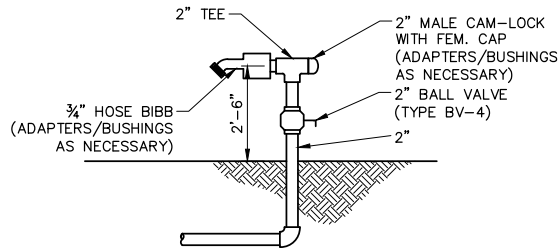
TYPE-3



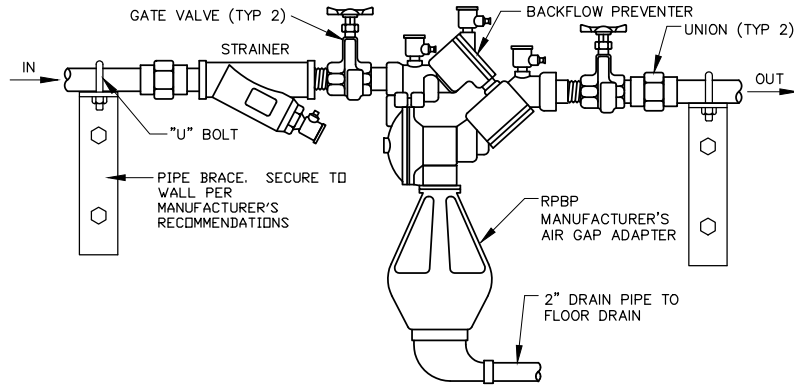
TYPE-4



TYPE-5



TYPE-6



NOTES:

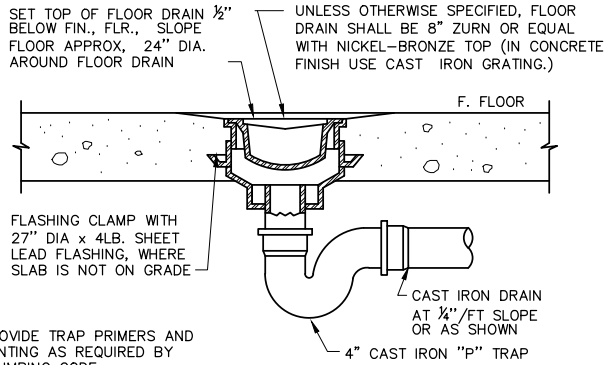
1. REDUCED PRESSURE BACKFLOW DEVICE:
 - a. FEBCO LF825Y OR EQUAL, 2" AND SMALLER
 - b. ANSI/ASSE 1013, AWWA C506; BRONZE BODY WITH BRONZE INTERNAL PARTS AND STAINLESS STEEL SPRINGS; TWO INDEPENDENTLY OPERATING, SPRING LOADED CHECK VALVES; DIAPHRAGM TYPE DIFFERENTIAL PRESSURE RELIEF VALVE LOCATED BETWEEN CHECK VALVES; THIRD CHECK VALVE THAT OPENS UNDER BACK PRESSURE IN CASE OF DIAPHRAGM FAILURE; NON-THREADED VENT OUTLET; ASSEMBLED WITH TWO GATE VALVES, STRAINER, AND FOUR TEST COCKS.

15210

HOSE BIBB MOUNTING ARRANGEMENTS
NOT TO SCALE

15250

REDUCED PRESSURE BACKFLOW
PREVENTER (≤ 2 INCH, INTERIOR)
NOT TO SCALE



NOTE:

1. PROVIDE TRAP PRIMERS AND VENTING AS REQUIRED BY PLUMBING CODE.
2. PROVIDE INTERNAL SEDIMENT TRAP.

15265

FLOOR DRAIN, TYPICAL
NOT TO SCALE

00000

RESERVED
NOT TO SCALE

00000

RESERVED
NOT TO SCALE



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ORIGINAL SIGNED
BY: MICHELLE L. JOHNSON
13810
DATE ORIGINAL
SIGNED: 08/12/2022

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NO.	REVISION	DESCRIPTION	BY	DATE

BOOSTER STATION REPLACEMENTS - PHASE II REBID
CITY OF MOSCOW

CIVIL & PROCESS MECHANICAL DETAILS
STANDARD DETAILS
15160 - 15168

FILE: 21-18-022-100_CD-501X
JUB PROJ. #: 21-18-022
DRAWN BY: WRH
DESIGN BY: LTS
CHECKED BY: MLJ

ONE INCH
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/4/2022

SHEET NUMBER:

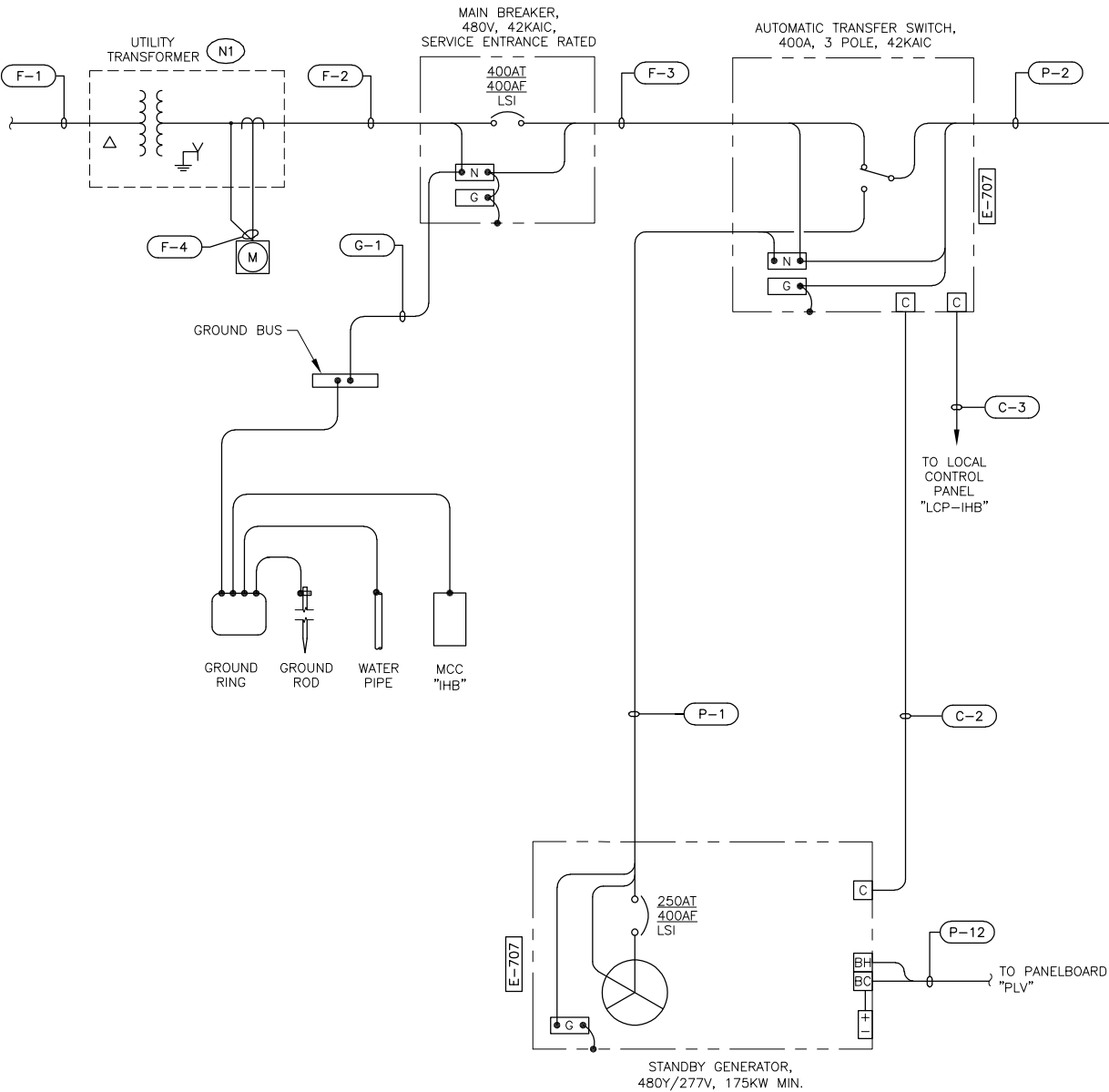
CD-508

Plot Date: 9/2/2022 1:19 PM Plotted By: Teri Schaeffer
Date Created: 9/12/2020 3:03 PM User: JUB - MOSCOW BOOSTER STATION DRAWINGS M18131-E-010.DWG

4.1

INDIAN HILLS ONE-LINE DIAGRAM
AND LOAD CALCULATION

NOT TO SCALE



NOTES: (for this sheet)

- (N1) SERVING UTILITY: AVISTA.
- (N2) ACTIVE HARMONIC FILTER SIZED TO MEET "IEEE 519".
- (N3) REFERENCE PANEL SCHEDULE FOR ADDITIONAL INFORMATION.

INDIAN HILLS LOAD CALCULATION			
480Y/277 VAC, 3Ø, 4w			
	LOAD (VA)		
	Ø A	Ø B	Ø C
M DUTY PUMP P-1	2,018	2,018	2,018
M DUTY PUMP P-2	2,018	2,018	2,018
M FIRE PUMP P-3	17,263	17,263	17,263
M FIRE PUMP P-4	17,263	17,263	17,263
M JOCKEY PUMP P-5	372	372	372
HVAC UNIT 1 HVAC-1	4,700	4,700	4,700
PANELBOARD PLV	992	1,320	860
EXHAUST FAN EF-1	443	443	443
ROOM HEATER HT-1	2,500	2,500	2,500
Total Connected Load (VA):	47,569	47,897	47,437
+ 25% of Continuous Load:	113	150	
+ 25% of Largest Motor:	4316	4316	4316
Total Code Load (VA):	51,998	52,363	51,753
Total Code Load (Amps):	188	190	187

C&W SCHEDULE								
ABBREVIATIONS: CAB-CABLE CTL-CONTROL DISC-DISCONNECT JB-JUNCTION BOX LEV-LEVEL MFG-MANUFACTURER MTR-MOTOR PRESS-PRESSURE PR-PAIR PWR-POWER RCPT-RECEPTACLE								
SIG-SIGNAL SPC-SHIELDED POWER CABLE STP- SHIELDED TWISTED PAIR CABLE SW-SWITCH XMITTER-TRANSMITTER (2-7C)- INDICATES TWO-SEVEN CONDUCTOR CABLES								
CONDUIT TAG	SERVICE	ROUTING		CONDUIT		CONDUCTORS		REMARKS OR REFERENCE DRAWING
		FROM	TO	QTY	SIZE	(QTY) & SIZE	GROUND SIZE	
F-1	UTILITY POWER	UTILITY POWER	UTILITY TRANSFORMER	3	2"	BY UTILITY		
F-2	UTILITY POWER	UTILITY TRANSFORMER	MAIN BREAKER	1	4"	(4) 500 KCMIL	-	
F-3	UTILITY POWER	MAIN BREAKER	AUTOMATIC TRANSFER SWITCH	2	2"	(4) 3/0 AWG	3 AWG	
F-4	UTILITY METERING	UTILITY TRANSFORMER	UTILITY TRANSFORMER	1	1"	(10) 10 AWG	10 AWG	
P-1	STANDBY POWER	STANDBY GENERATOR	AUTOMATIC TRANSFER SWITCH	2	2"	(4) 1/0 AWG	4 AWG	
P-2	MCC-IHB	AL TOMATIC TRANSFER SWTCH	MCC-IHB	2	2"	(4) 3/0 AWG	3 AWG	
P-3	DUTY PUMP P-1	MCC-IHB	DUTY PUMP P-1	1	1-1/2"	(1-3C) 12 AWG SPC, (2) 14 AWG	IN CAB	
P-4	DUTY PUMP P-2	MCC-IHB	DUTY PUMP P-2	1	1-1/2"	(1-3C) 12 AWG SPC, (2) 14 AWG	IN CAB	
P-5	FIRE PUMP P-3	MCC-IHB	FIRE PUMP P-3	1	2"	(1-3C) 4 AWG SPC, (2) 14 AWG	IN CAB	
P-6	FIRE PUMP P-4	MCC-IHB	FIRE PUMP P-4	1	2"	(1-3C) 4 AWG SPC, (2) 14 AWG	IN CAB	
P-7	JOCKEY PUMP P-5	MCC-IHB	JOCKEY PUMP P-5	1	1-1/2"	(1-3C) 12 AWG SPC, (2) 14 AWG	IN CAB	
P-8	HVAC UNIT HVAC-1	MCC-IHB	HVAC UNIT HVAC-1	1	3/4"	(3) 8 AWG	10 AWG	
P-9	ACTIVE HARMONIC FILTER	MCC-IHB	ACTIVE HARMONIC FILTER	1	1-1/2"	(4) 3 AWG	8 AWG	
P-10	EXHAUST FAN EF-1	MCC-IHB	EXHAUST FAN EF-1	1	3/4"	(3) 12 AWG	12 AWG	
P-11	ROOM HEATER HT-1	MCC-IHB	ROOM HEATER HT-1	1	3/4"	(3) 12 AWG	12 AWG	
P-12	GENERATOR BLOCK HEATER/CHARGE	MCC-IHB	GENERATOR ENCLOSURE	1	1"	(4) 10 AWG (2) 12 AWG	12 AWG	
C-1	INTAKE LOUVER	MCC-IHB	INTAKE LOUVER	1	3/4"	(2) 14 AWG	14 AWG	
C-2	GENERATOR CONTROLS	AL TOMATIC TRANSFER SWTCH	GENERATOR PANEL	1	1"	(7) 14 AWG	14 AWG	
C-3	STATUS	LCP-IHB	AUTOMATIC TRANSFER SWITCH	1	1"	(10) 14 AWG	14 AWG	
C-4	ACTIVE HARMONIC FILTER	LCP-IHB	ACTIVE HARMONIC FILTER	1	3/4"	(7) 14 AWG	14 AWG	
C-5	CONTROLS	LCP-IHB	MCC-IHB	1	1-1/2"	(28) 14 AWG	14 AWG	
S-1	FLOW METERS	LCP-IHB	JB-S1	1	1-1/2"	(2) 16 AWG STP, (8) 14 AWG	14 AWG	
S-1A	FLOW METER FIT-01	JB-S1	FLOW METER FIT-01	1	3/4"	(1) 16 AWG STP, (4) 14 AWG	14 AWG	
S-1B	FLOW METER FIT-02	JB-S1	FLOW METER FIT-02	1	3/4"	(1) 16 AWG STP, (4) 14 AWG	14 AWG	
S-1C	FLOW METER FIT-01	JB-S1	FLOW METER FIT-01	1	3/4"	(1) MFG CAB	14 AWG	
S-1D	FLOW METER FIT-02	JB-S1	FLOW METER FIT-02	1	3/4"	(1) MFG CAB	14 AWG	
S-2	FLOW METERS	JB-S1	JB-S2	1	1-1/2"	(2) MFG CAB	14 AWG	
S-2A	FLOW METER FE-01	JB-S2	FLOW METER FE-01	1	3/4"	(1) MFG CAB	14 AWG	
S-2B	FLOW METER FE-02	JB-S2	FLOW METER FE-02	1	3/4"	(1) MFG CAB	14 AWG	
S-3	PRESSURE TRANSMITTER 1	LCP-IHB	PRESSURE TRANSMITTER PIT-01	1	1"	(1) 16 AWG STP, (2) 14 AWG	14 AWG	
S-4	PRESSURE TRANSMITTER 2	LCP-IHB	PRESSURE TRANSMITTER PIT-02	1	1"	(1) 16 AWG STP, (2) 14 AWG	14 AWG	
S-5	INDIAN HILLS FIBER JUNCTION BOX	LCP-IHB	INDIAN HILLS FIBER JUNCTION BOX	1	2"	(2) FIBER JUMPER PAIR	14 AWG	
S-6	FIBER OPTIC	COMMUNICATION UTILITY	INDIAN HILLS FIBER JUNCTION BOX	1	2"	6 PAIR FIBER	14 AWG	
S-7	GENERATOR	GENERATOR	LCP-IHB	1	2"	(1) CAT 6E	14 AWG	
S-8	DUTY PUMP P-1 SUCTION PRESSURE	MCC-IHB	DUTY PUMP P-1 PT-02	1	3/4"	(1) 16 AWG STP, (2) 14 AWG	14 AWG	
S-9	DUTY PUMP P-2 SUCTION PRESSURE	MCC-IHB	DUTY PUMP P-2 PT-04	1	3/4"	(1) 16 AWG STP, (2) 14 AWG	14 AWG	
S-10	JOCKEY PUMP P-5 SUCTION PRESSURE	MCC-IHB	JOCKEY PUMP P-5 PT-08	1	3/4"	(1) 16 AWG STP, (2) 14 AWG	14 AWG	
S-11	DUTY PUMP P-1 DISCHARGE PRESSURE	MCC-IHB	DUTY PUMP P-1 PT-01	1	3/4"	(1) 16 AWG STP, (2) 14 AWG	14 AWG	
S-12	DUTY PUMP P-2 DISCHARGE PRESSURE	MCC-IHB	DUTY PUMP P-2 PT-03	1	3/4"	(1) 16 AWG STP, (2) 14 AWG	14 AWG	
S-13	JOCKEY PUMP P-5 DISCHARGE PRESSURE	MCC-IHB	JOCKEY PUMP P-5 PT-07	1	3/4"	(1) 16 AWG STP, (2) 14 AWG	14 AWG	
S-14	FIRE PUMP P-3 DISCHARGE PRESSURE	MCC-IHB	FIRE PUMP P-3 PT-05	1	3/4"	(1) 16 AWG STP, (2) 14 AWG	14 AWG	
S-15	FIRE PUMP P-4 DISCHARGE PRESSURE	MCC-IHB	FIRE PUMP P-4 PT-06	1	3/4"	(1) 16 AWG STP, (2) 14 AWG	14 AWG	
S-16	ACTIVE HARMONIC FILTER	MCC-IHB	ACTIVE HARMONIC FILTER	1	1-1/2"	(3) 16 AWG STP	14 AWG	
S-17	CONTROLS	LCP-IHB	MCC-IHB	1	2"	(8) CAT 6E	14 AWG	
G-1	GROUND	MAIN BREAKER	GROUND BUS BAR	1			1/0 AWG	BARE CU
G-2	GROUND	GROUND BUS BAR	GROUND RING	1			2/0 AWG	BARE CU
G-3	GROUND	GROUND RING	MCC-IHB	1			1/0 AWG	BARE CU
G-4	GROUND	GROUND BUS BAR	GROUND ROD	1			4 AWG	BARE CU
G-5	GROUND	GROUND RING	WATER PIPE	1			1/0 AWG	BARE CU
G-6	GROUND	GROUND RING	GROUND RING	1			2/0 AWG	BARE CU IN FOOTING
R-1	SPARE	LCP-IHB	STUB UP NEAR FUTURE MOX SYSTEM	1	1-1/2"	PULL STRING	-	
R-2	SPARE	MCC-IHB	STUB UP NEAR FUTURE MOX SYSTEM	2	1-1/2"	PULL STRING	-	



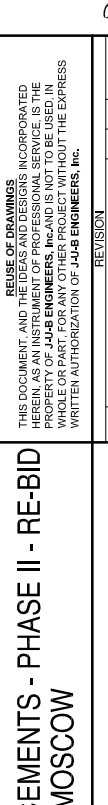
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08/11/22

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

INDIAN HILLS CONDUIT AND WIRE SCHEDULE

FILE: M18131-E-011
JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW

AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY

LAST UPDATED: 8/11/2022

SHEET NUMBER:

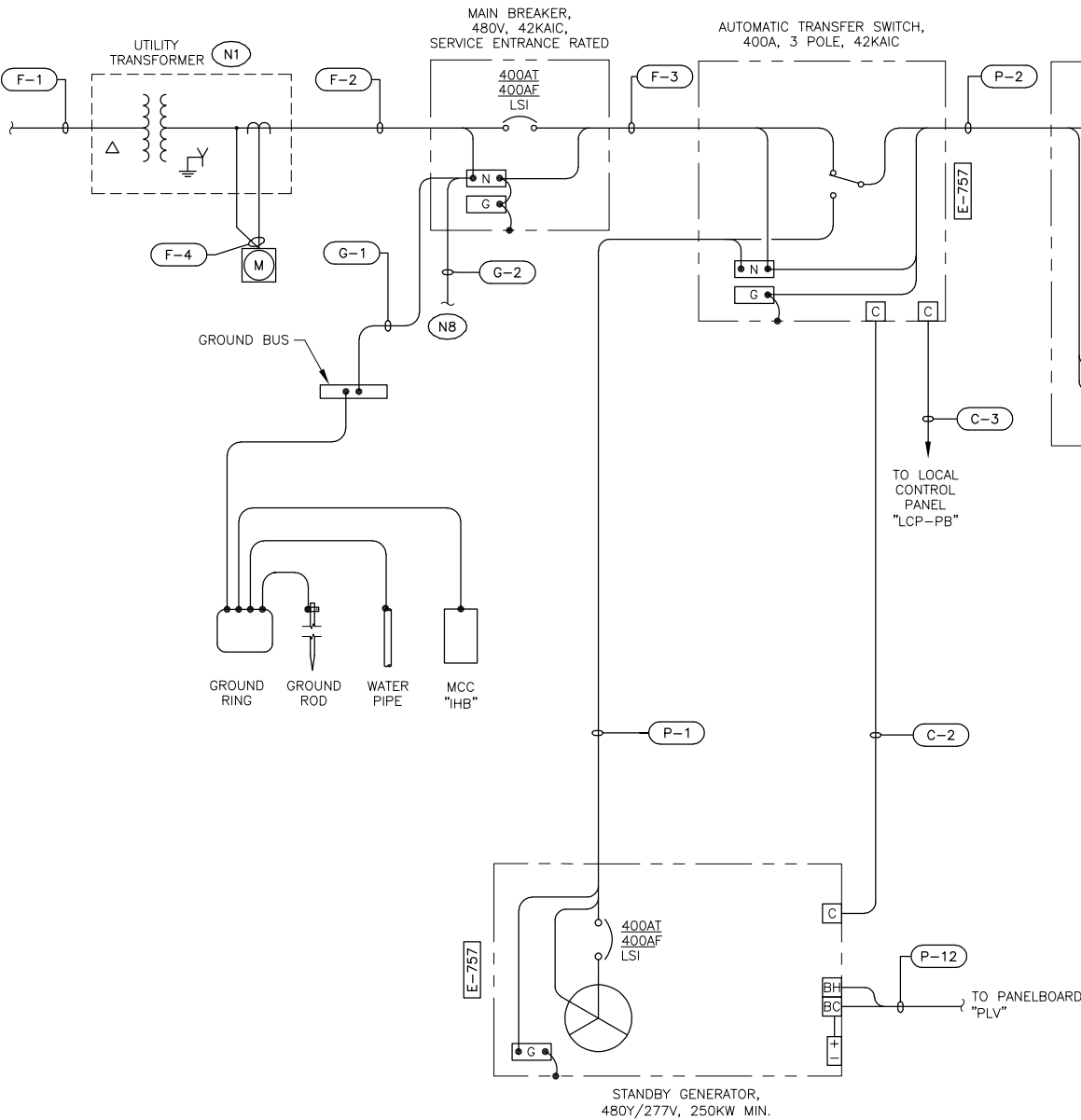
E-011

Plot Date: 5/2/2022 1:21 PM Plotted By: Teri Schaeffer
Date Created: 5/12/2020 3:03 PM M18131 - JUB - MOSCOW BOOSTER STATION DRAWINGS M18131-E-050.DWG

4.1

PONDEROSA ONE-LINE DIAGRAM
AND LOAD CALCULATION

NOT TO SCALE



NOTES: (for this sheet)

- (N1) SERVING UTILITY: AVISTA.
(N2) ACTIVE HARMONIC FILTER SIZED TO MEET "IEEE 519".
(N3) REFERENCE PANEL SCHEDULE FOR ADDITIONAL INFORMATION.

PONDEROSA LOAD CALCULATION			
480Y/277 VAC, 3Ø, 4w			
	LOAD (VA)		
	Ø A	Ø B	Ø C
M DUTY PUMP 1	3,719	3,719	3,719
M DUTY PUMP 2	3,719	3,719	3,719
M FIRE PUMP 1	17,263	17,263	17,263
M FIRE PUMP 2	17,263	17,263	17,263
M FIRE PUMP 3 (FUTURE)	17,263	17,263	17,263
JOCKEY PUMP	580	580	580
HVAC -1	4,700	4,700	4,700
PANELBOARD PLV1	992	1,320	860
EXHAUST FAN EF-1	443	443	443
ROOM HEATER HT-1	2,500	2,500	2,500
Total Connected Load (VA):	68,442	68,770	68,310
+ 25% of Continuous Load:	113	150	
+ 25% of Largest Motor:	4316	4316	4316
Total Code Load (VA):	72,871	73,236	72,626
Total Code Load (Amps):	264	265	263

[illegible]



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BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

PONDEROSA CONDUIT AND WIRE SCHEDULE

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NO.	DESCRIPTION
1	FOR RE-BID
0	FOR BID
NO.	DATE

FILE: M18131-E-051

JUB PROJ. #: 21-18-022

DRAWN BY: TLS

DESIGN BY: MLB

CHECKED BY: RJW

ONE INCH

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LAST UPDATED: 8/11/2022

SHEET NUMBER:

E-051

Plot Date: 8/2/2022 1:26 PM Plotted By: Teri Schaeuwerder
Date Created: 8/10/2020 3:00 PM User: JUB - MOSCOW BOOSTER STATIONS DRAWINGS M18131-E-052 DWG

4.1

PONDEROSA ELECTRICAL SCHEDULES

NOT TO SCALE

LUMINAIRE SCHEDULE								
TYPE	DESCRIPTION	VOLTS	LAMP QTY	WATTS / FIXTURE	MOUNTING	MANUFACTURE NUMBER		NOTES
						BASIS OF DESIGN	OR EQUAL BY	
F1/F1E	4' SURFACE MOUNTED, ENCLOSED AND GASKETED, RIBBED FROSTED ACRYLIC LENS, BATTERY BACK WHERE INDICATED, 4000K	120	LED 5570 LUMENS	48	SURFACE CEILING	SOLAS RAY: SV4-048-DMV-A-RF-40-EM(WHERE INDICATED)-CMB	OR EQUAL	
M1E	WALL PACK MOUNTED LUMINAIRE WITH LOW PROFILE LED ARRAY, REFRACTIVE LENS, BRONZE FINISH, PHOTOELECTRIC CELL, MOTION SENSOR	120 VAC	LED	58	WALL SURFACE	LUMARK #XTOR6BRL-W-PC1-MS-L20, OR APPROVED EQUAL	OR EQUAL	

INSTRUMENTATION SCHEDULE								
ABBREVIATIONS: 3PH-Three Phase, DISCH-DISCH, DO2-Dissolved Oxygen, FVNR-Full Voltage Non-Reversing Starter, HTR-Heater, HI-High, INSF- Intrinsically Safe, LEV-Level, LO-Low , MAG-Magnetic, MFG-Manufacturer, OD- Oxidation Ditch, ORP-Oxidation Reduction Potential, PRESS-Pressure, SUB-Submersible, SW-Sw itch, TEFC-Totally Enclosed Fan Cooled,TEMP-Temperature, US-Ultrasonic, XMTR-Transmitter, XP-Explosion proof								
DEVICE TAG	DESCRIPTION	NEMA / TYPE	SUPPLY VOLTAGE	SIGNAL TYPE	INSTRUMENT TYPE	RANGE	NOMINAL OR SET POINT	SIZE OR NOTES
EFFLUENT LIFT STATION AREA								
FIT-01	FLOW TRANSMITTER	MAG	24VDC	4-20mA	FIT TYPE 1	0-3,000 GPM	-	-
FIT-02	FLOW TRANSMITTER	MAG	24VDC	4-20mA	FIT TYPE 1	0-3,000 GPM		
PIT-01	PRESSURE TRANSMITTER	PRESS	24VDC	4-20mA	PIT TYPE 1			
PIT-02	PRESSURE TRANSMITTER	PRESS	24VDC	4-20mA	PIT TYPE 1			
PT-01	P-1 DISCHARGE PRESSURE TRANSMITTER	PRESS	24VDC	4-20mA	PIT TYPE 1			
PT-02	P-1 SUCTION PRESSURE TRANSMITTER	PRESS	24VDC	4-20mA	PIT TYPE 1			
PT-03	P-2 DISCHARGE PRESSURE TRANSMITTER	PRESS	24VDC	4-20mA	PIT TYPE 1			
PT-04	P-2 SUCTION PRESSURE TRANSMITTER	PRESS	24VDC	4-20mA	PIT TYPE 1			
PT-05	P-3 DISCHARGE PRESSURE TRANSMITTER	PRESS	24VDC	4-20mA	PIT TYPE 1			
PT-06	P-4 DISCHARGE PRESSURE TRANSMITTER	PRESS	24VDC	4-20mA	PIT TYPE 1			
PT-07	P-5 DISCHARGE PRESSURE TRANSMITTER	PRESS	24VDC	4-20mA	PIT TYPE 1			
PT-08	P-5 SUCTION PRESSURE TRANSMITTER	PRESS	24VDC	4-20mA	PIT TYPE 1			
LS-01	PUMP ROOM FLOOD SWITCH	SW	120VAC	DISCRETE	LS TYPE 1			
TT-01	PUMP ROOM TEMERATURE TRANSMITTER	TEMP	24VDC	4-20mA	TT TYPE 1			

ELECTRICAL-MECHANICAL EQUIPMENT SCHEDULE					
TAG	ITEM	SIZE / RATING	DESCRIPTION	MANUFACTURE NUMBER - BASIS OF DESIGN	NOTES
ALL VENTILATION CONTROL AND TEMPERATURE ALARM THERMOSTATS	THERMOSTAT, TEMP SWITCH HIGH (TSH) OR TEMP SWITCH LOW (TSL)	25 AMPS, 120V, SPDT, NEMA 4X, 40-110 °F	CORROSION RESISTANT WALL MOUNTED INDUSTRIAL THERMOSTAT.	PECO #TF115-001, OR APPROVED EQUAL	SWITCH TO BE CONFIGURED "LOW" OR "HIGH" WHERE INDICATED ON PLANS
HVAC-1	HVAC UNIT	16 A, 480V, 3-PH	EXTERIOR WALL MOUNTED UNIT, 5-TON AIR CONDITIONING, 7.5KW ELECTRIC HEATING, RIGHT SIDED COMPRESSOR AND CONTROLS INCLUDING DISCONNECT, DIGITAL THERMOSTAT/CONTROLLER, BAROMETRIC FRESH AIR DAMPER, 1" WASHABLE FILTER, BEIGE FINISH, EXTREME DUTY DOOR, PHENOLIC COATED OUTDOOR COIL	BARD #W5RV2-T15XWXX2, OR APPROVED EQUAL	PROVIDE MINIMUM CLEARANCE OF 20-INCHES OF EACH SIDE OF UNIT PER MANUFACTURES INSTRUCTIONS.
EF-1	EXHAUST FAN	1/2 HP, 460 VAC, 3-PH	10" CENTRIFUGAL BACKWARD INCLINED EXHAUST VENTILATOR, EXTERIOR WALL MOUNTED, BELT DRIVE, BIRD SCREEN, BACK DRAFT DAMPER, RATED OUTDOOR WET LOCATION USE, INTEGRAL MOTOR DISCONNECT SWITCH, 1800 CFM @ 0.4 SP	COOK, ACW-B MODEL #135W3B WITH OPTIONS, OR APPROVED EQUAL	MOUNT TOP OF UNIT +10'-0" AFF. INTERLOCK OPERATION OF VENTILATOR AND INTAKE LOUVER WITH AIR CONDITIONING UNIT OPERATION.
ML-1	MOTORIZED LOUVER	48" x 48" 1300 CFM @ 0.4" WC, 120 VAC, 1 PHASE, MOTORIZED OPERATOR, POWER OPEN, SPRING CLOSE.	ALUMINUM COMBINATION DAMPER WITH STATIONARY DRAINABLE FRONT BLADES. UNIT TO BE MOTOR OPERATED TO OPEN, SPRING TO CLOSE, OPERATOR LINKAGE. UNIT TO BE PROVIDED WITH ALUMINUM BIRD SCREEN.	RUSKIN MODEL #ELC6375DAX WITH OPTIONS, OR APPROVED EQUAL	MOUNT BOTTOM OF UNIT +24" AFF
FH-1	FILTER HOLDING FRAME FOR MOTORIZED DAMPER	(4) 24"x24"x2" FILTER HOLDING FRAMES, 48"x48" OVERALL	16 GAUGE GALVANIZED STEEL FILTER FRAME WIT, SPRING CLIPS, AND GASKETED FRAME DESIGNED FOR EASY FILTER REPLACEMENT. UNIT TO BE MOUNTED AND FLANGED TO COVER THE DISCHARGE SIDE OF THE INTAKE MOTORIZED LOUVER.	KOCH #AR-442 WITH TYPE CA-02 CLIPS, OR APPROVED EQUAL	PROVIDE CORRECTLY SIZED FILTER
HT-1	ROOM HEATER	7.5KW 480V 3-PH	SELF-CONTAINED BLOWER HEATER, FAN FORCED, CEILING MOUNTED	CHROMALOX #H-VH-07-43-30, 7.5KW 480V	13" FROM BACK TO WALL, 6" FROM SIDE TO WALL, 6" FROM TOP TO CEILING

Panel: PLV		Mains: 150A		Voltage: 208Y/120 VAC, 3ø, 4w				
Mounting: MCC		Poles: 30	Type: CB	Min. A.I.C.: 10,000				
Use and/or Area Served	C/B	Cir. No.	Load			Cir. No.	C/B	Use and/or Area Served
			Ø A	Ø B	Ø C			
INTERIOR LIGHTING	20	1	452			2	20	INTERIOR RECEPTACLES
EXTERIOR LIGHTING	20	3		600		4	20	INTERIOR RECEPTACLES
				720				
LOCAL CONTROL PANEL	20	5			500	6	20	EXTERIOR RECEPTACLES
					360			
CHLORINE STATOIN (FUTURE)	20	7				8	20	GENERATOR BATTERY CHARGER
SPARE	20	9	100			10	30	GENERATOR BLOCK HEATER
				750				
SPARE	20	11			750	12	2	GENERATOR BLOCK HEATER
SPARE	20	13				14	20	SPARE
SPARE	20	15				16	20	SPARE
SPARE	20	17				18	20	SPARE
SPARE	20	19				20	20	SPARE
SPARE	30	21				22	20	SPARE
SPARE	2	23				24	20	SPARE
SPARE	50	25				26	2	SPARE
SPARE	2	27				28	15	SPARE
SPARE	20	29				30	15	SPARE
Total Connected Load (VA):			1092	2070	1610	NOTES: 1.) PROVIDE INTEGRAL PANEL SPD PROTECTION.		
+ 25% of Continuous Load:			113	338	188			
Total Code Load (VA):			1205	2408	1798	FNL		
Total Code Load (Amps):			11	21	15			

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(208) 666-4021 fax

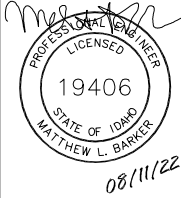


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NO.	DESCRIPTION	BY DATE

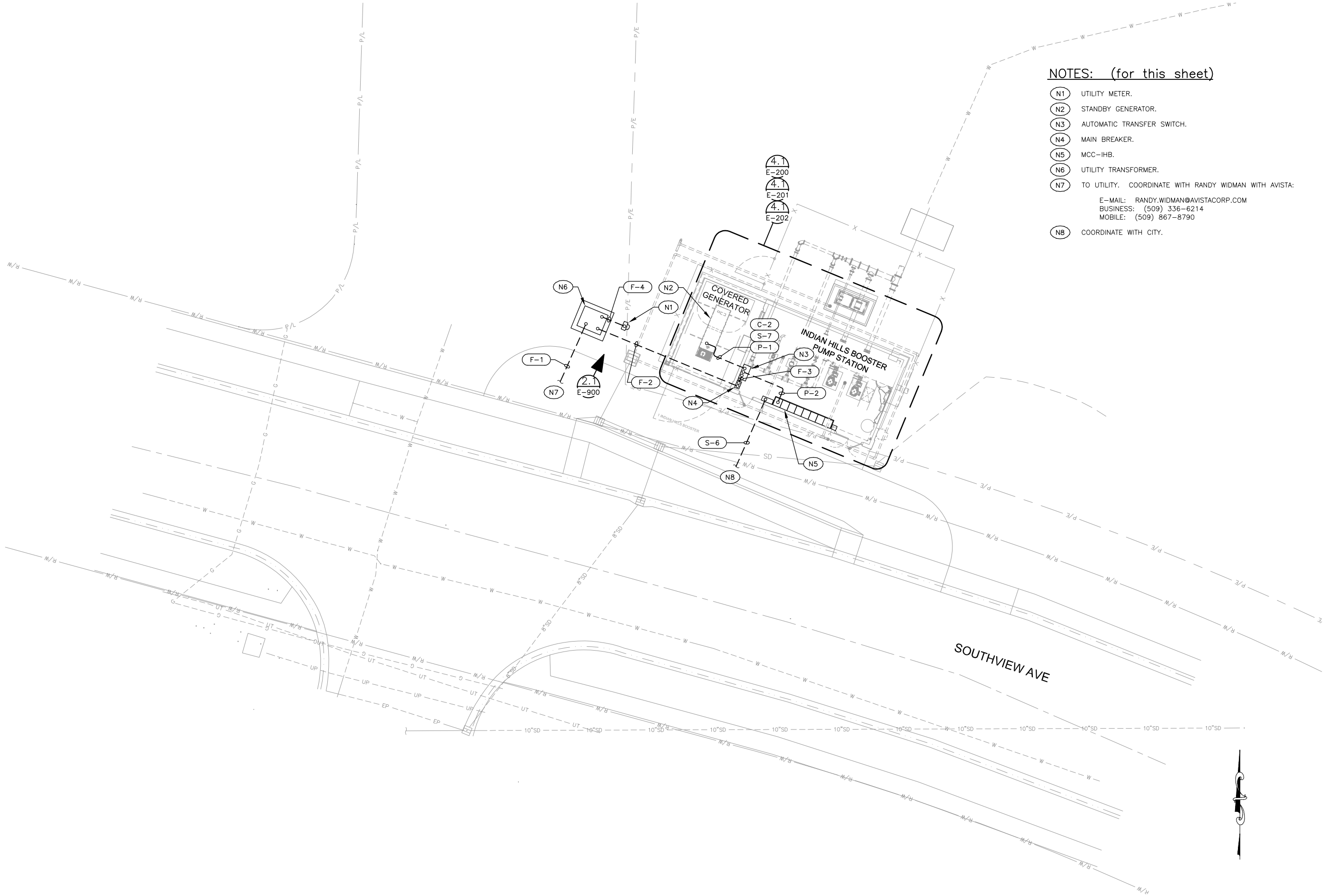
BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

PONDEROSA ELECTRICAL SCHEDULES

FILE : M18131-E-052
JUB PROJ. # : 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

E-052

4.1 INDIAN HILLS ELECTRICAL SITE PLAN
SCALE: 1"=10'



NOTES: (for this sheet)

- (N1) UTILITY METER.
- (N2) STANDBY GENERATOR.
- (N3) AUTOMATIC TRANSFER SWITCH.
- (N4) MAIN BREAKER.
- (N5) MCC-IHB.
- (N6) UTILITY TRANSFORMER.
- (N7) TO UTILITY. COORDINATE WITH RANDY WIDMAN WITH AVISTA:
E-MAIL: RANDY.WIDMAN@AVISTACORP.COM
BUSINESS: (509) 336-6214
MOBILE: (509) 867-8790
- (N8) COORDINATE WITH CITY.

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BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW
INDIAN HILLS ELECTRICAL SITE PLAN



- (N1) UTILITY METER.
- (N2) STANDBY GENERATOR.
- (N3) AUTOMATIC TRANSFER SWITCH.
- (N4) MAIN BREAKER.
- (N5) MCC-PB.
- (N6) UTILITY TRANSFORMER.
- (N7) TO UTILITY, COORDINATE WITH AVISTA.

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1	FOR RE-BID	MLB	08/11/22
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0			

PONDEROSA ELECTRICAL SITE PLAN

SHEET NUMBER:

E-150

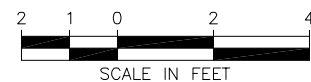
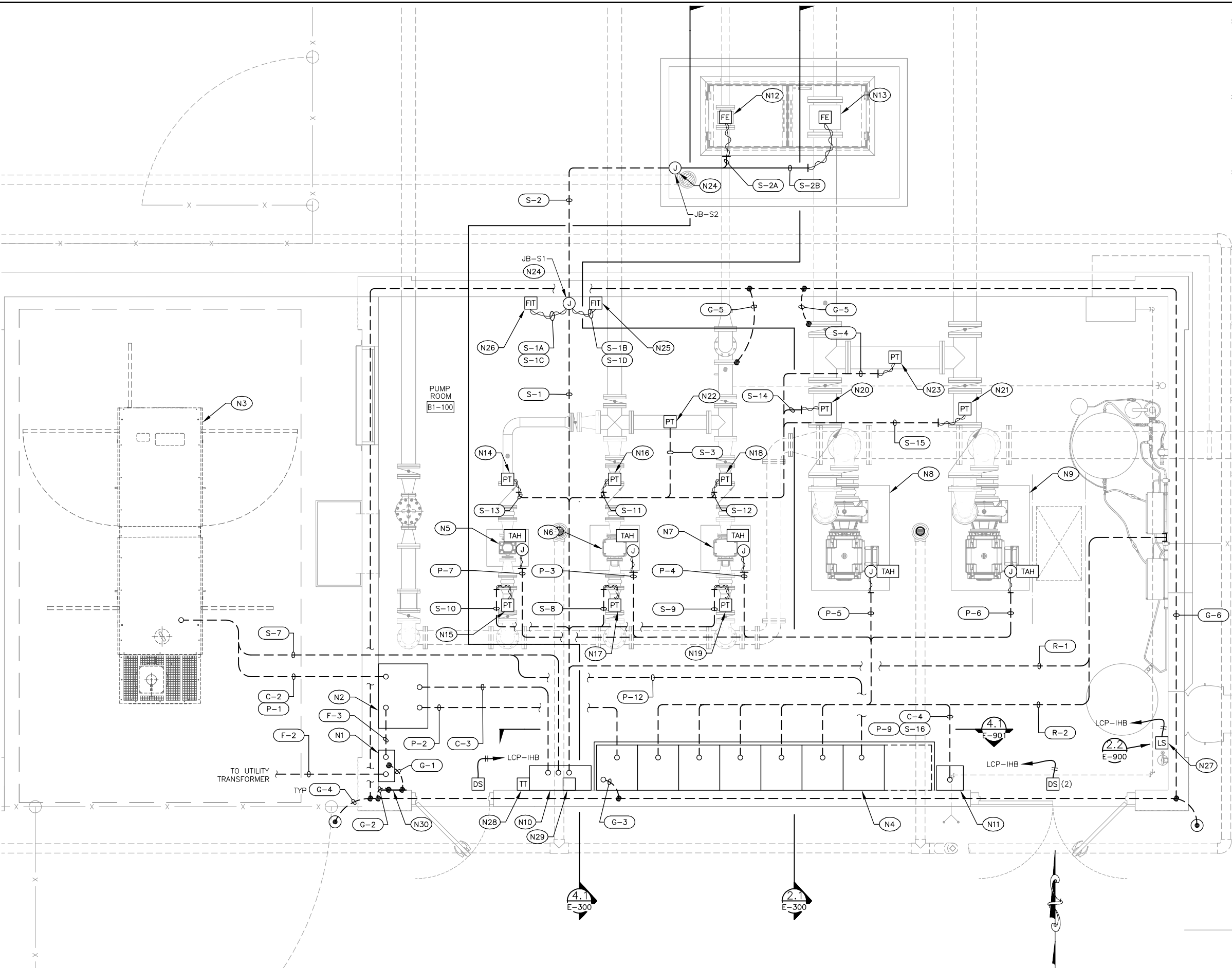
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Date Created: 8/10/2020 S:\0318\18131 - JUB - MOSCOW BOOSTER STATIONS\DRAWINGS\M18131-E-200.DWG

4.1 INDIAN HILLS POWER AND CONTROL PLAN

SCALE: 1/2" = 1'-0"

Page 1359 of 1426

Page 1422



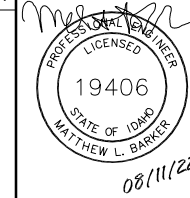
NOTES: (for this sheet)

- N1 MAIN BREAKER.
- N2 AUTOMATIC TRANSFER SWITCH.
- N3 STANDBY GENERATOR.
- N4 MOTOR CONTROL CENTER "MCC-IHB".
- N5 JOCKEY PUMP "P-5".
- N6 DUTY PUMP "P-1".
- N7 DUTY PUMP "P-2".
- N8 FIRE PUMP "P-3".
- N9 FIRE PUMP "P-4".
- N10 LOCAL CONTROL PANEL "LCP-IHB".
- N11 ACTIVE HARMONIC FILTER.
- N12 FLOW ELEMENT "FE-01".
- N13 FLOW ELEMENT "FE-02".
- N14 P-5 DISCHARGE PRESSURE "PT-07".
- N15 P-5 SUCTION PRESSURE "PT-08".
- N16 P-1 DISCHARGE PRESSURE "PT-01".
- N17 P-1 SUCTION PRESSURE "PT-02".
- N18 P-2 DISCHARGE PRESSURE "PT-03".
- N19 P-2 SUCTION PRESSURE "PT-04".
- N20 P-3 DISCHARGE PRESSURE "PT-05".
- N21 P-4 DISCHARGE PRESSURE "PT-06".
- N22 PRESSURE TRANSMITTER "PT-01".
- N23 PRESSURE TRANSMITTER "PT-02".
- N24 6" X 6" NEMA 4X JUNCTION BOX.
- N25 FLOW METER "FIT-02".
- N26 FLOW METER "FIT-01".
- N27 FLOOD SWITCH "LS-01".
- N28 TEMPERATURE TRANSMITTER "TT-01".
- N29 FIBER OPTIC JUNCTION BOX (BELOW LCP-IHB).
- N30 GROUND BUS PER DETAIL "1.2" ON SHEET "E-900".

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BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

INDIAN HILLS POWER AND CONTROL PLAN

FILE: M18131-E-200
JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022

SHEET NUMBER:

E-200

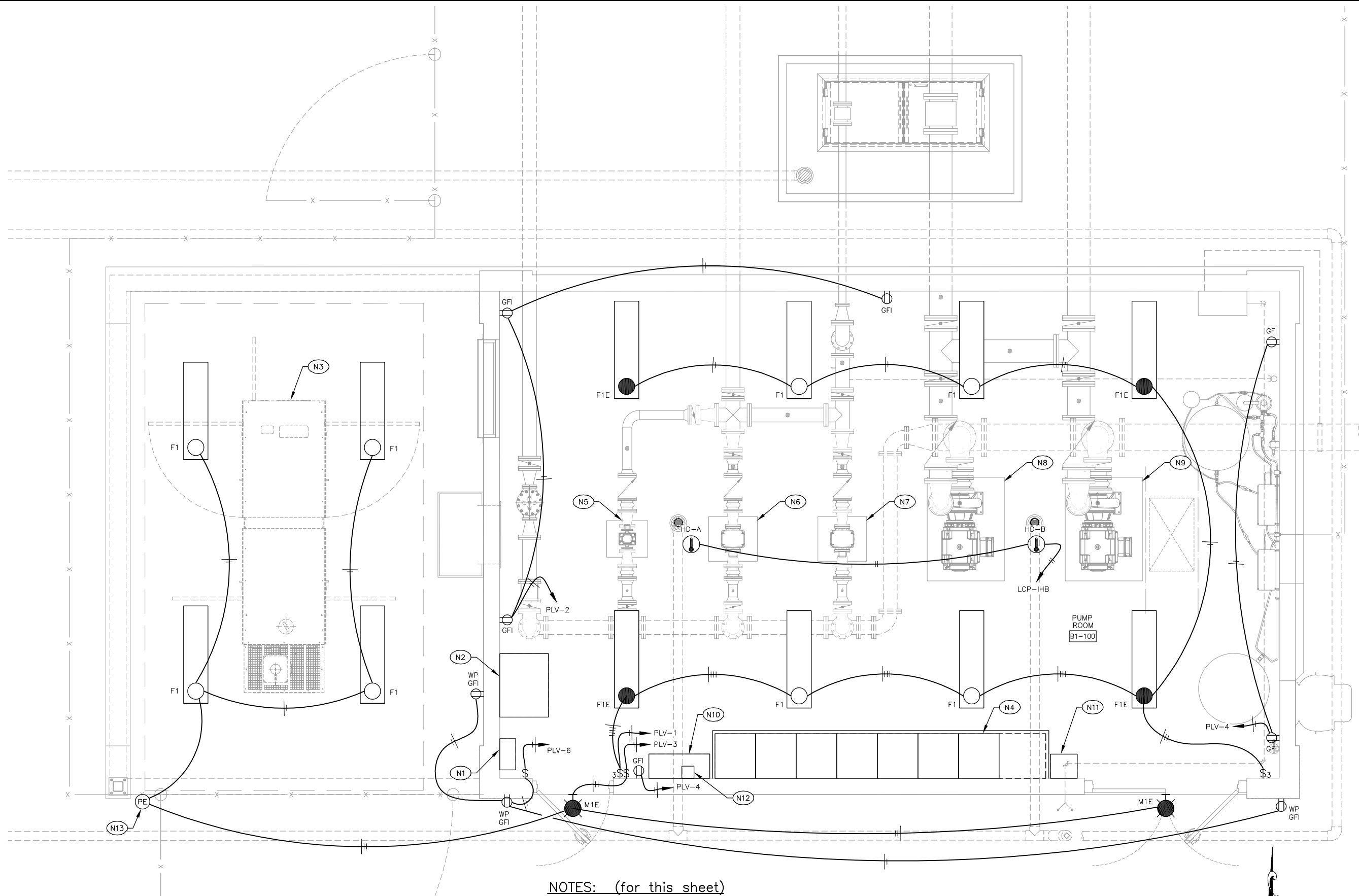
Plot Date: 8/2/2022 1:34 PM Plotted By: Teri Schaefer
Date Created: 8/10/2020 S:\03\BID\1831 - JUB - MOSCOW BOOSTER STATIONS\DRAWINGS\M1831-E-201.DWG

4.1

INDIAN HILLS LIGHTING AND RECEPTACLE PLAN
SCALE: 1/2" = 1'-0"

Page 1360 of 1426

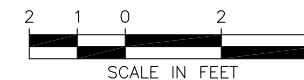
Page 1423



NOTES: (for this sheet)

- | | |
|-------------------------------------|--------------------------------------|
| (N1) MAIN BREAKER. | (N7) DUTY PUMP "P-2". |
| (N2) AUTOMATIC TRANSFER SWITCH. | (N8) FIRE PUMP "P-3". |
| (N3) STANDBY GENERATOR. | (N9) FIRE PUMP "P-4". |
| (N4) MOTOR CONTROL PANEL "MCC-IHB". | (N10) LOCAL CONTROL PANEL "LCP-IHB". |
| (N5) JOCKEY PUMP "P-5". | (N11) ACTIVE HARMONIC FILTER. |
| (N6) DUTY PUMP "P-1". | (N12) FIBER OPTIC JUNCTION BOX. |

- (N13) INSTALL PHOTOCELL MOTION SENSOR FOR GENERATOR AREA LIGHTS.



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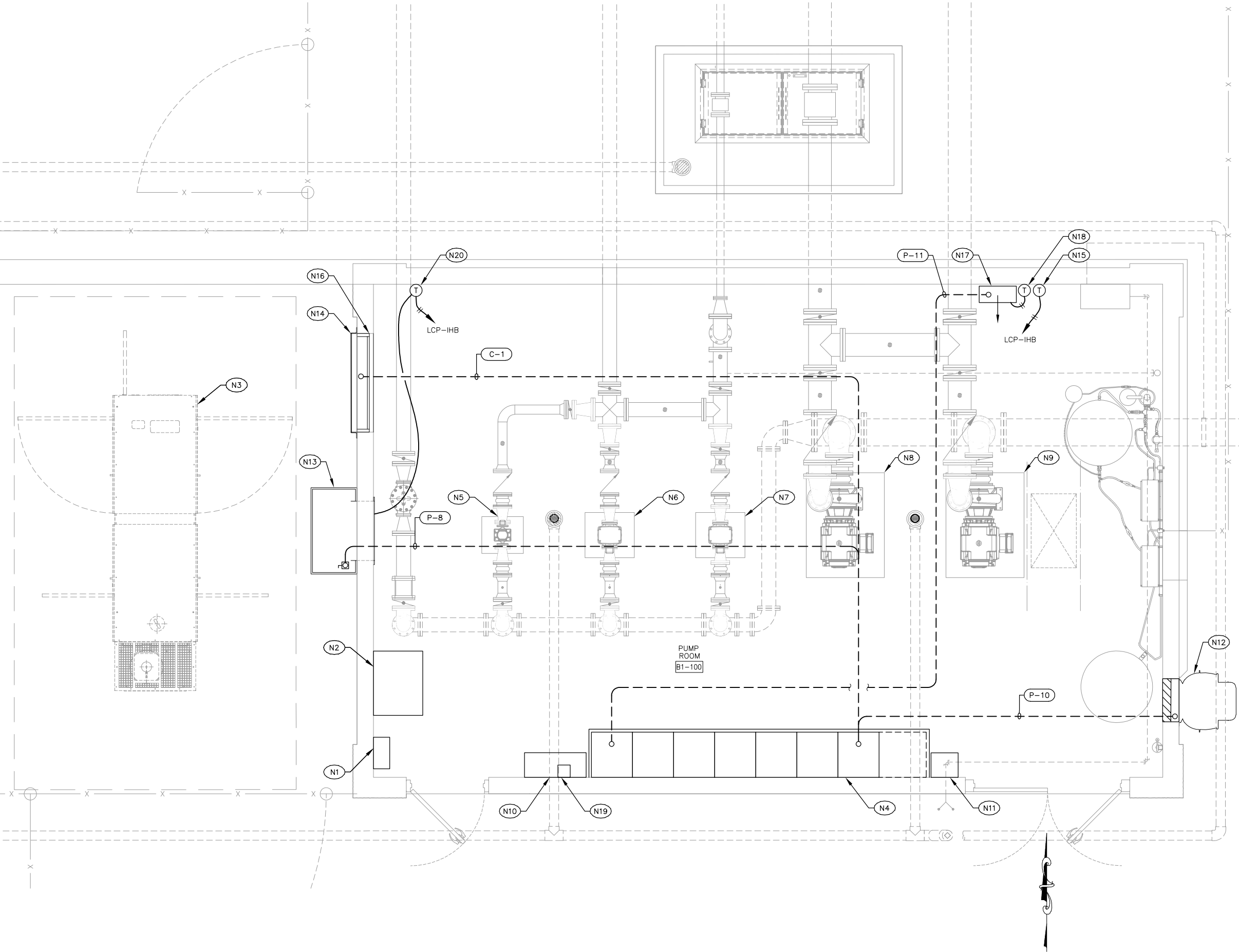
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NO.	DESCRIPTION
1	FOR REBID
0	DATE: 08/11/22
BY: APR	DATE

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

INDIAN HILLS LIGHTING AND RECEPTACLE PLAN

FILE: M1831-E-201
JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:
E-201

4.1 INDIAN HILLS HVAC PLAN
SCALE: 1/2" = 1'-0"



- NOTES: (for this sheet)
- N1 MAIN BREAKER.
 - N2 AUTOMATIC TRANSFER SWITCH.
 - N3 STANDBY GENERATOR.
 - N4 MOTOR CONTROL CENTER "MCC-IHB".
 - N5 JOCKEY PUMP "P-5".
 - N6 DUTY PUMP "P-1".
 - N7 DUTY PUMP "P-2".
 - N8 FIRE PUMP "P-3".
 - N9 FIRE PUMP "P-4".
 - N10 LOCAL CONTROL PANEL "LCP-IHB".
 - N11 ACTIVE HARMONIC FILTER.
 - N12 EXHAUST FAN "EF-1".
 - N13 HVAC UNIT "HVAC-1".
 - N14 INTAKE "ML-1".
 - N15 VENTILATION THERMOSTAT.
 - N16 FILTER FRAME "FH-1".
 - N17 HEATER "HT-1".
 - N18 HEATER THERMOSTAT.
 - N19 FIBER OPTIC JUNCTION BOX (BELOW).
 - N20 HVAC-1 THERMOSTAT. PROVIDE CONDUCTORS AS REQUIRED. PROVIDE PLC INTERLOCK FOR AIR CONDITIONING CALL.

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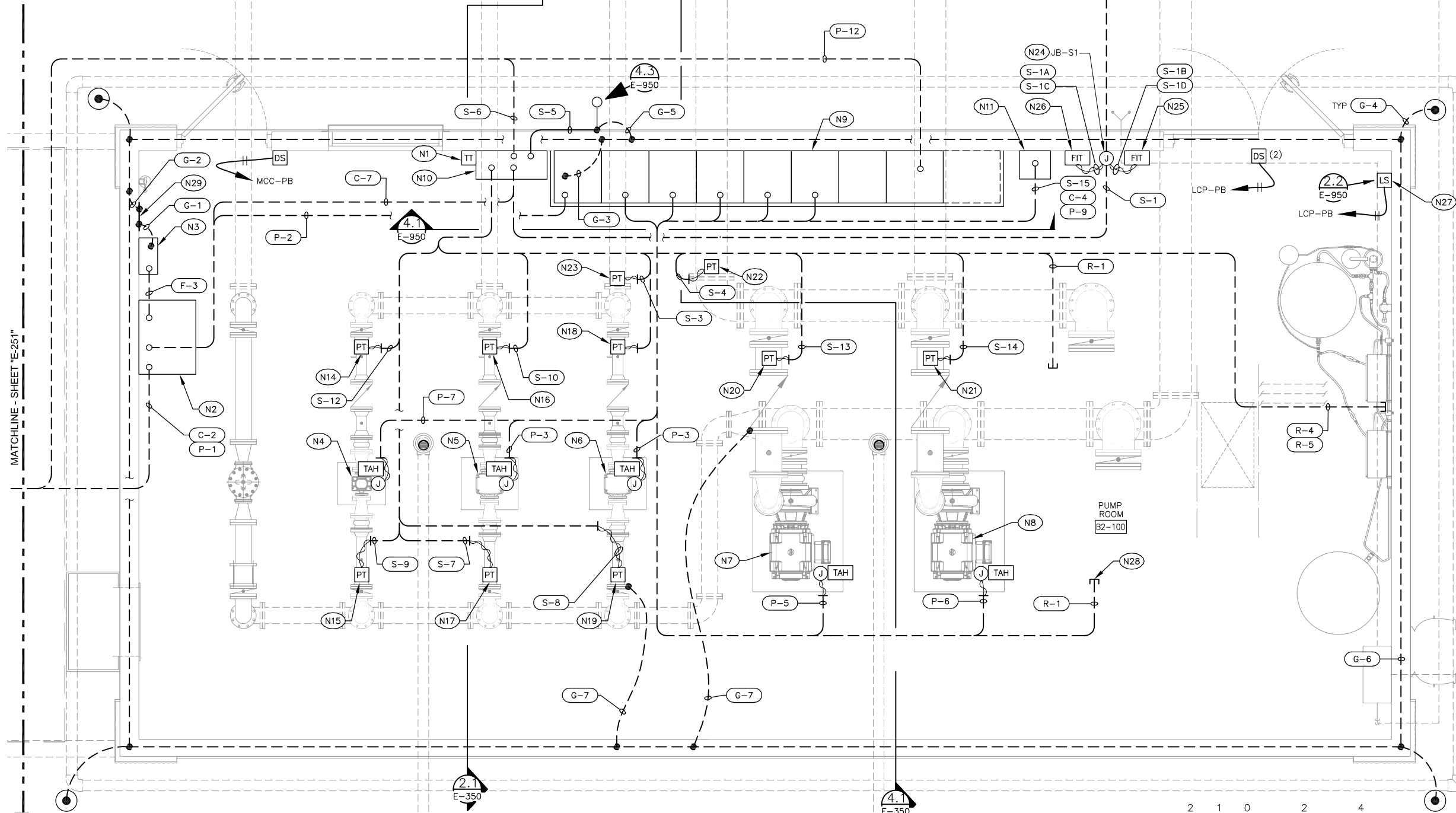
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NO.	DESCRIPTION	DATE	BY
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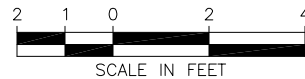
BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW
INDIAN HILLS HVAC PLAN

FILE: M18131-E-202
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DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:
E-202

Plot Date: 8/2/2022 1:37 PM Plotted By: Teri Schaeffer
Date Created: 8/1/2020 S:\0311\JUB-MOSCOW BOOSTER STATIONS\DRAWINGS\M18131-E-250-L.DWG



4.1 PONDEROSA POWER AND CONTROL PLAN - SHEET 1
SCALE: 1/2" = 1'-0"



NOTES: (for this sheet)

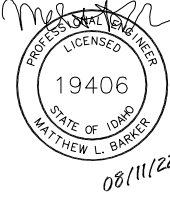
- N1 TEMPERATURE TRANSMITTER "TT-01".
- N2 AUTOMATIC TRANSFER SWITCH.
- N3 MAIN BREAKER.
- N4 JOCKEY PUMP "P-5".
- N5 DUTY PUMP "P-1".
- N6 DUTY PUMP "P-2".
- N7 FIRE PUMP "P-3".
- N8 FIRE PUMP "P-4".
- N9 MOTOR CONTROL CENTER "MCC-PB".
- N10 LOCAL CONTROL CENTER "LCP-PB".
- N11 HARMONIC FILTER.
- N12 FLOW ELEMENT "FE-01".
- N13 FLOW ELEMENT "FE-02".
- N14 P-5 DISCHARGE PRESSURE "PT-07".
- N15 P-5 SUCTION PRESSURE "PT-08".
- N16 P-1 DISCHARGE PRESSURE "PT-01".
- N17 P-1 SUCTION PRESSURE "PT-02".
- N18 P-2 DISCHARGE PRESSURE "PT-03".
- N19 P-2 SUCTION PRESSURE "PT-04".
- N20 P-3 DISCHARGE PRESSURE "PT-05".
- N21 P-4 DISCHARGE PRESSURE "PT-06".
- N22 PRESSURE TRANSMITTER "PIT-01" LOCATED ON VERTICAL PIPE.
- N23 PRESSURE TRANSMITTER "PIT-02" LOCATED ON VERTICAL PIPE.
- N24 6" X 6" NEMA 4X J-BOX. FLOW
- N25 METER "FIT-01".
- N26 FLOW METER "FIT-01".
- N27 FLOOD SWITCH "LS-01".
- N28 PROVIDE CAP FLUSH WITH FLOOR.
- N29 GROUND BUS PER DETAIL "1.2" ON SHEET "E-950".

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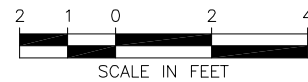
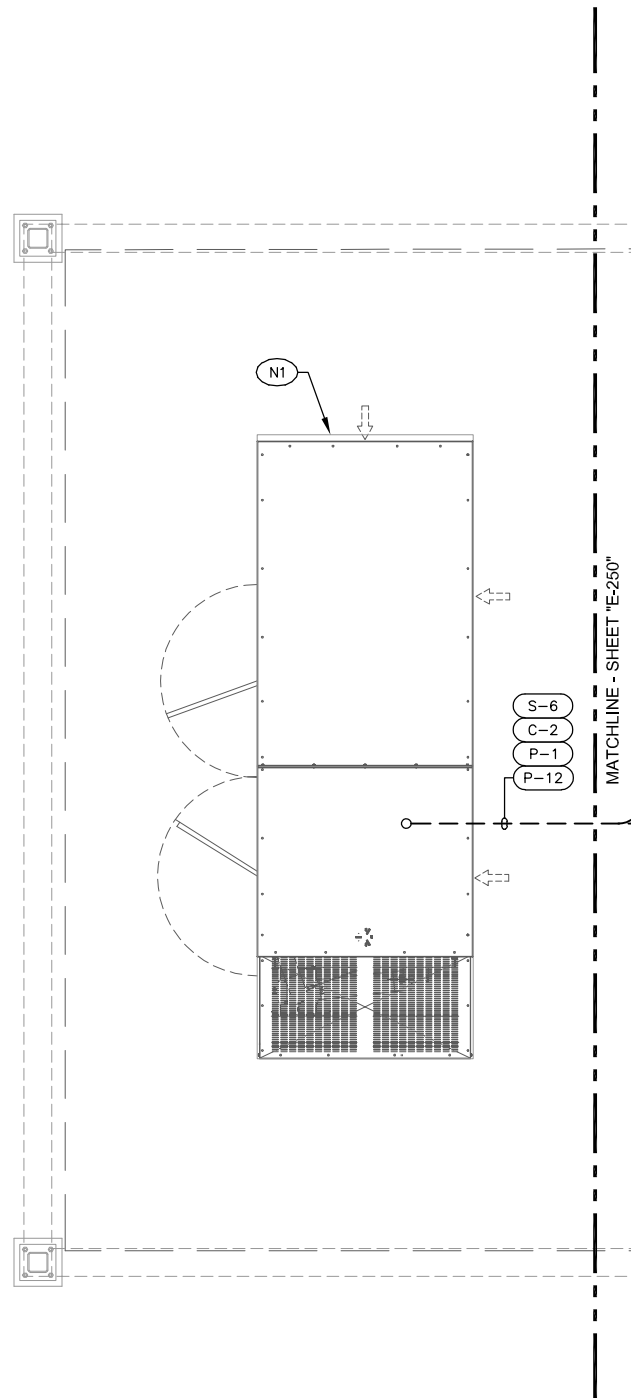
BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW
PONDEROSA POWER AND CONTROL PLAN
SHEET 1

FILE: M18131-E-250-1
JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

E-250

(4.1)

PONDEROSA POWER AND CONTROL PLAN – SHEET 2
SCALE: 1/2" = 1'-0"



NOTES: (for this sheet)

(N1) STANDBY GENERATOR.

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0	FOR BID	TLS	02/01/22
		RV	5/8/22

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

PONDEROSA POWER AND CONTROL PLAN SHEET 2

FILE : M18131-E-250-1
JUB PROJ. # : 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW

ONE INCH

AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY

LAST UPDATED: 8/11/2022

SHEET NUMBER:

E-251

Plot Date: 8/2/2022 1:43 PM Plotted By: Teri Schaeffer
Date Created: 8/10/2020 3:00 PM User: JUB-MOSCOW BOOSTER STATIONS DRAWINGS M181-E-252-LDWG

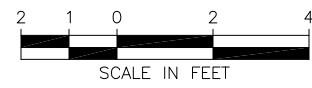
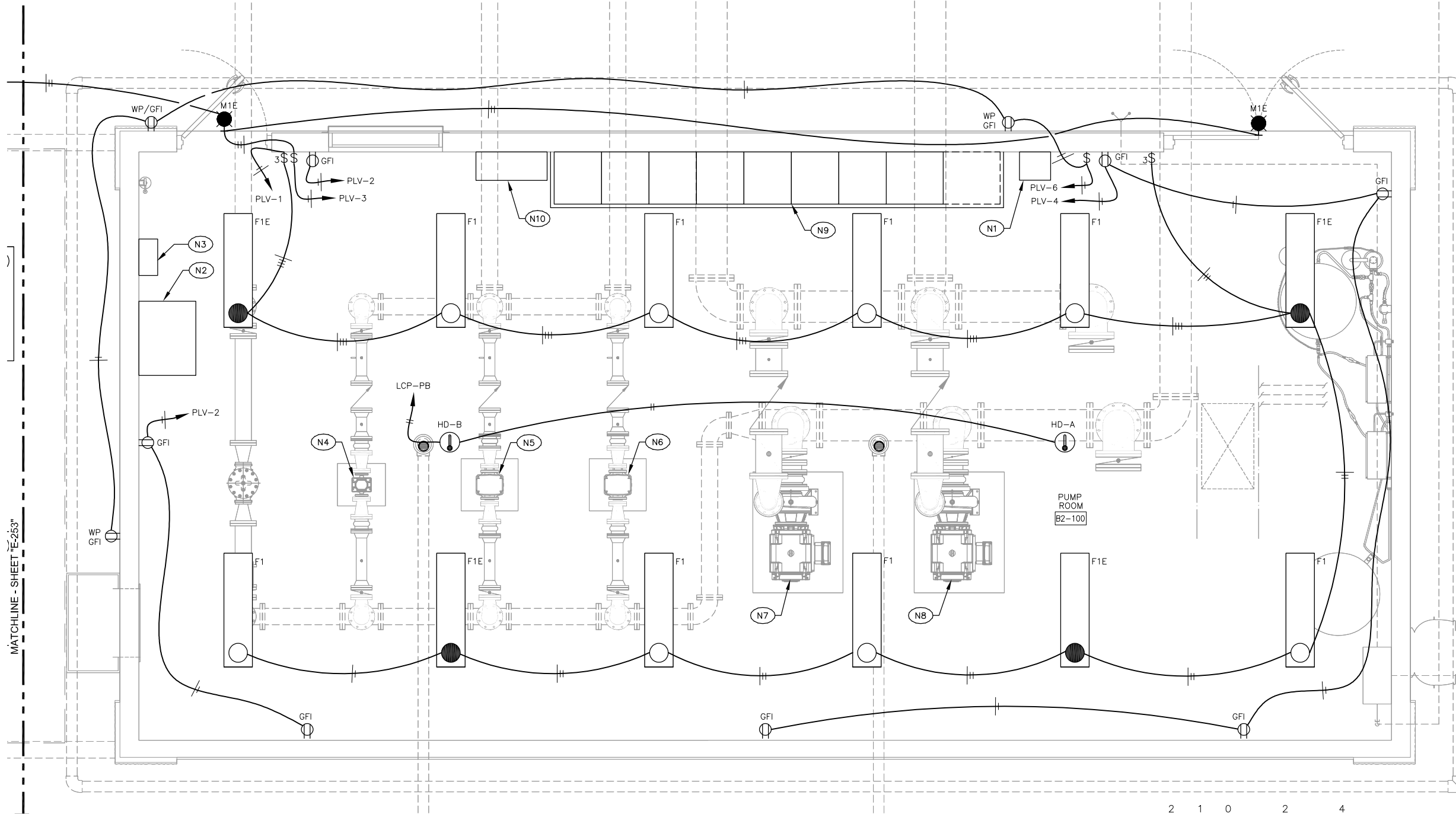
4.1

4.1 PONDEROSA LIGHTING AND RECEPTACLE PLAN – SHEET 1

SCALE: 1/2" = 1'-0"

Page 1364 of 1426

Page 1427



NOTES: (for this sheet)

- (N1) HARMONIC FILTER.
- (N2) AUTOMATIC TRANSFER SWITCH.
- (N3) MAIN CIRCUIT BREAKER.
- (N4) JOCKEY PUMP "P-5".
- (N5) DUTY PUMP "P-1".
- (N6) DUTY PUMP "P-2".
- (N7) FIRE PUMP "P-3".
- (N8) FIRE PUMP "P-4".
- (N9) MOTOR CONTROL CENTER "MCC-IND".
- (N10) LOCAL CONTROL PANEL "LCP-IND".

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REVISION	DATE	BY	DATE
FOR REBID	08/11/22	1	08/11/22
DESCRIPTION	0	0	08/11/22

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW
PONDEROSA LIGHTING AND RECEPTACLE PLAN
SHEET 1

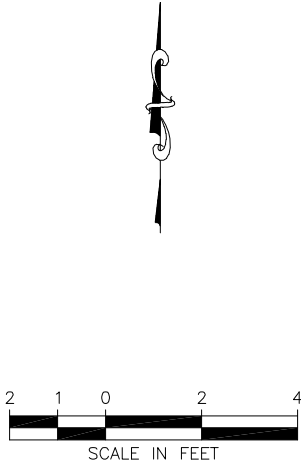
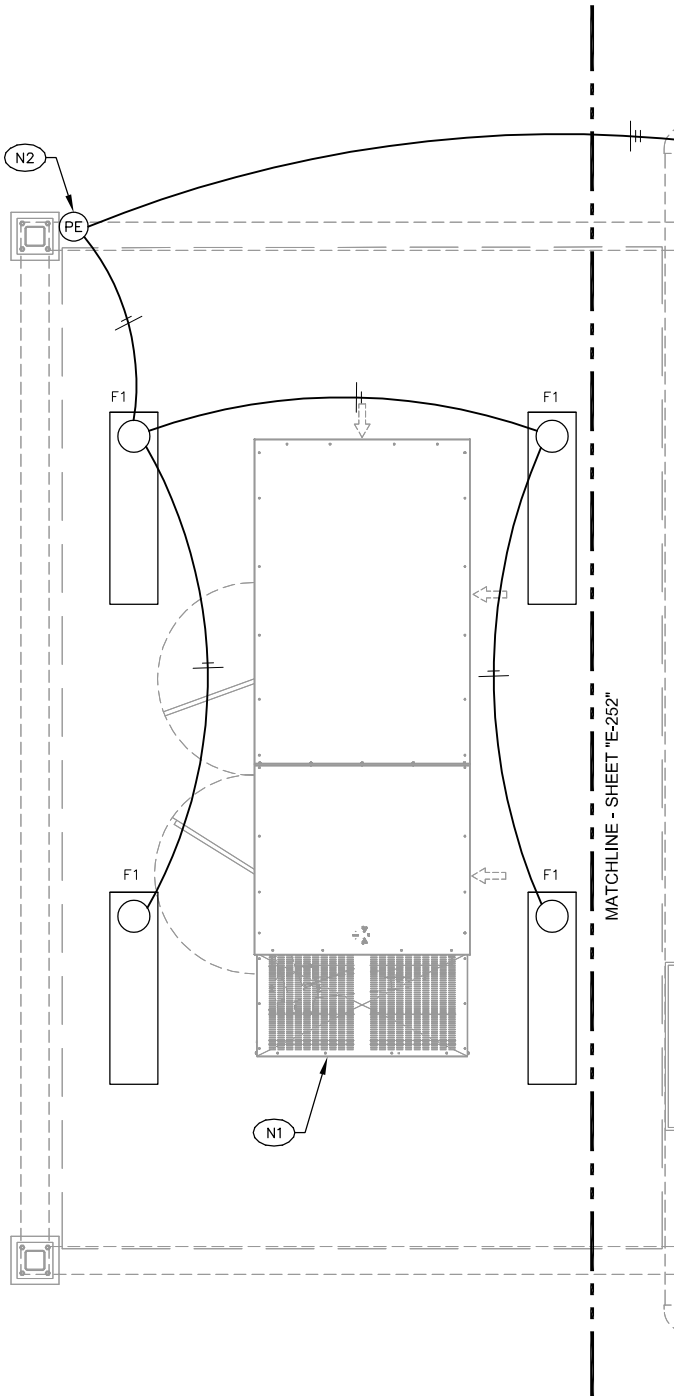
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JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:
E-252

Plot Date: 8/2/2022 1:44 PM Plotted By: Teri Schawwerder
Date Created: 8/18/2020 3:00 PM M18131 - JUB - MOSCOW BOOSTER STATIONS DRAWINGS M18131-E-253-1.DWG

4.1

PONDEROSA LIGHTING AND RECEPTACLE PLAN – SHEET 2

SCALE: 1/2" = 1'-0"



NOTES: (for this sheet)

- N1

STANDBY GENERATOR.
- N2

INSTALL PHOTOCELL/MOTION SENSOR FOR GENERATOR AREA LIGHTS.

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19406
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MATTHEW L. BARKER
08/11/22

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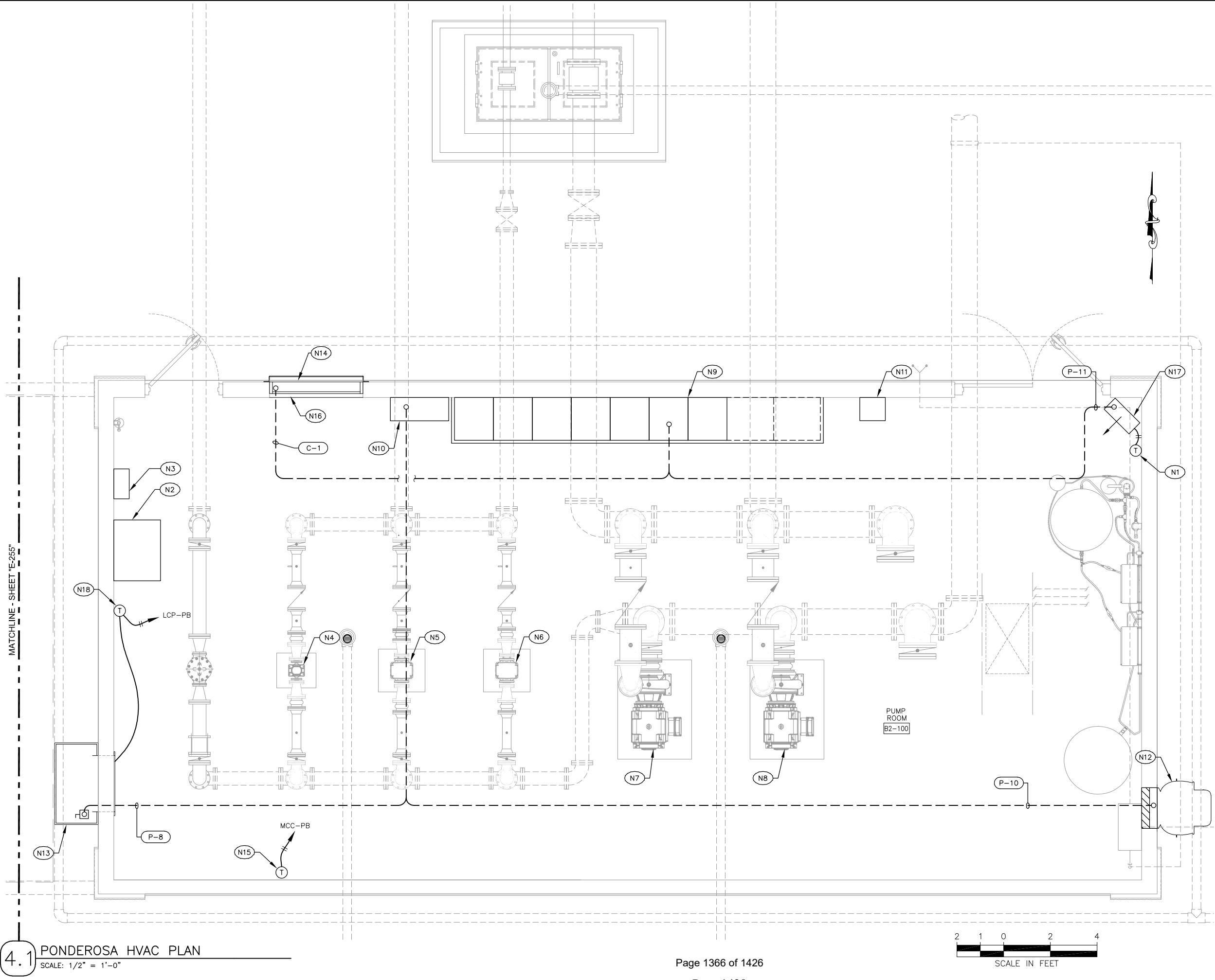
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0	DESCRIPTION

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

PONDEROSA LIGHTING AND RECEPTACLE PLAN
SHEET 2

FILE : M18131-E-253-3
JUB PROJ. # : 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:
E-253

Plot Date: 8/2/2022 1:46 PM Plotted By: Teri Schaeffer
Date Created: 8/10/2020 3:00 PM M18131-JUB-MOSCOW BOOSTER STATIONS DRAWINGS M18131-E-254 DWG



NOTES: (for this sheet)

- N1 HEATER THERMOSTAT.
- N2 AUTOMATIC TRANSFER SWITCH.
- N3 MAIN CIRCUIT BREAKER.
- N4 JOCKEY PUMP "P-5".
- N5 DUTY PUMP "P-1".
- N6 DUTY PUMP "P-2".
- N7 FIRE PUMP "P-3".
- N8 FIRE PUMP "P-4".
- N9 MOTOR CONTROL CENTER "MCC-PB".
- N10 LOCAL CONTROL PANEL "LCP-PB".
- N11 HARMONIC FILTER.
- N12 EXHAUST FAN "EF-1".
- N13 HVAC UNIT "HVAC-1".
- N14 INTAKE "ML-1".
- N15 VENTILATION THERMOSTAT.
- N16 FILTER FRAME "FH-1".
- N17 HEATER "HT-1".
- N18 HVAC-1 THERMOSTAT. PROVIDE CONDUCTORS AS REQUIRED. PROVIDE PLC INTERLOCK FOR AIR CONDITIONER.

1038 W. Davidson Avenue
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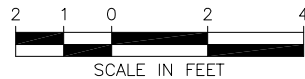
NO.	REVISION	DATE
1	FOR REBID	08/11/22
0	DESCRIPTION	08/11/22

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

PONDEROSA HVAC PLAN

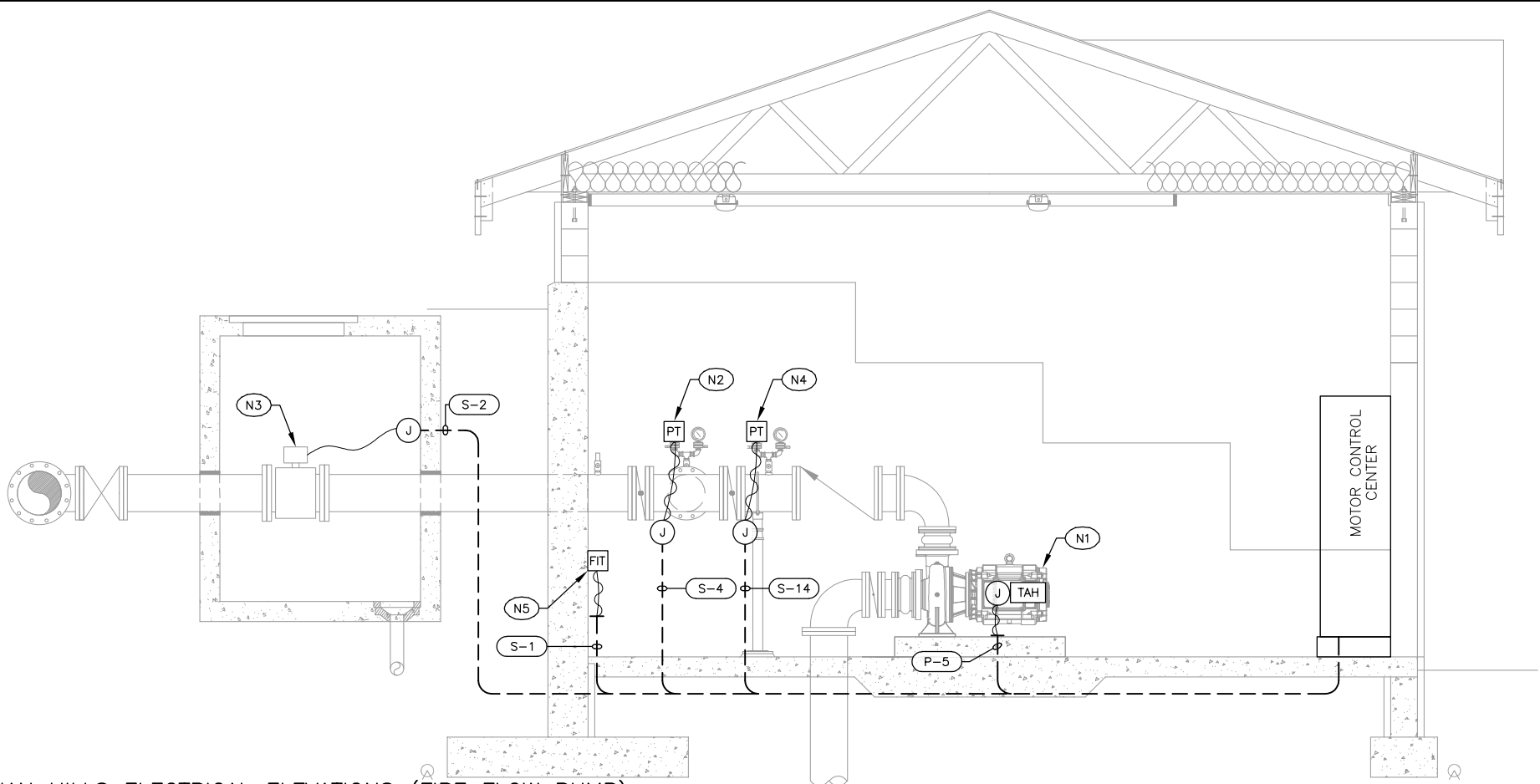
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JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:
E-254

4.1 PONDEROSA HVAC PLAN
SCALE: 1/2" = 1'-0"



Plot Date: 5/2/2022 1:48 PM Plotted By: Teri Schaefer
Date Created: 5/12/2020 S:\0318\18131 - JUB - MOSCOW BOOSTER STATIONS\DRAWINGS\M18131-E-300.DWG

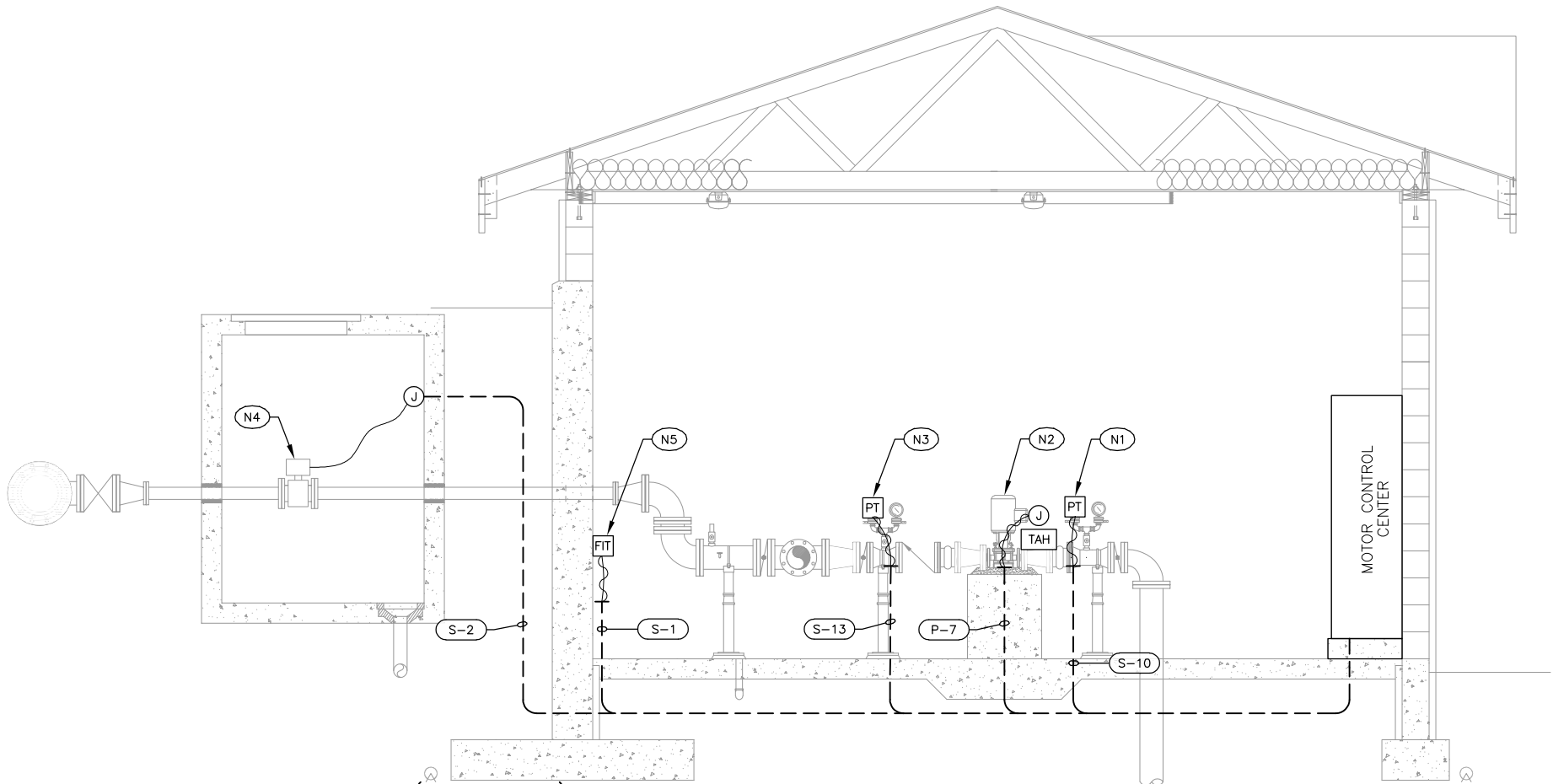
2.1 INDIAN HILLS ELECTRICAL ELEVATIONS (FIRE FLOW PUMP)
SCALE: 1/2" = 1'-0"



- NOTES: (for this detail)
- N1 FIRE PUMP "P-3".
 - N2 PRESSURE TRANSMITTER "PT-02".
 - N3 FLOW ELEMENT "FE-02".
 - N4 P-3 DISCHARGE PRESSURE "PT-05".
 - N5 FLOW METER "FIT-02".



4.1 INDIAN HILLS ELECTRICAL ELEVATIONS (DUTY PUMP)
SCALE: 1/2" = 1'-0"



- NOTES: (for this detail)
- N1 P-5 SUCTION PRESSURE "PT-08"
 - N2 JOCKEY PUMP "P-5".
 - N3 P-5 DISCHARGE PRESSURE "PT-07"
 - N4 FLOW ELEMENT "FE-01".
 - N5 FLOW METER "FIT-01".



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0	DESCRIPTION	08/11/22

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

INDIAN HILLS ELECTRICAL ELEVATIONS

FILE: M18131-E-300
JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW

ONE INCH
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022

SHEET NUMBER:
E-300

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[illegible]

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID CITY OF MOSCOW	LOCAL CONTROL PANEL "LCP-IHB" SCHEDULES
--	--

—	—	—	—	—	—	—	CHF DATE: 09-01-2017 JOB NUMBER: 17-2132	
—	—	—	—	—	—	—		
—	—	—	—	—	—	—		
—	—	—	—	—	—	—		
—	—	—	—	0	08-24-2018	FINAL AS INSTALLED	KRW	
REV	DATE:	DESCRIPTION:	BY:	REV	DATE:	DESCRIPTION:	BY:	

CONTRACTOR INSTALLED, OWNER PROVIDED PANEL. CLOUDED ITEMS REQUIRE CONTRACTOR MODIFICATION OR REVISION OF SUPPLIED CONTROL PANEL.

Plot Date: 02/22/2022 1:51 PM Plotted By: Teri Schaeffer
Date Created: 01/12/2020 3:03 PM User: JUB-MOSCOW BOOSTER STATIONS DRAWINGS M18131-E-701.DWG

4.1

LOCAL CONTROL PANEL
"LCP-IHB" LAYOUT

NOT TO SCALE



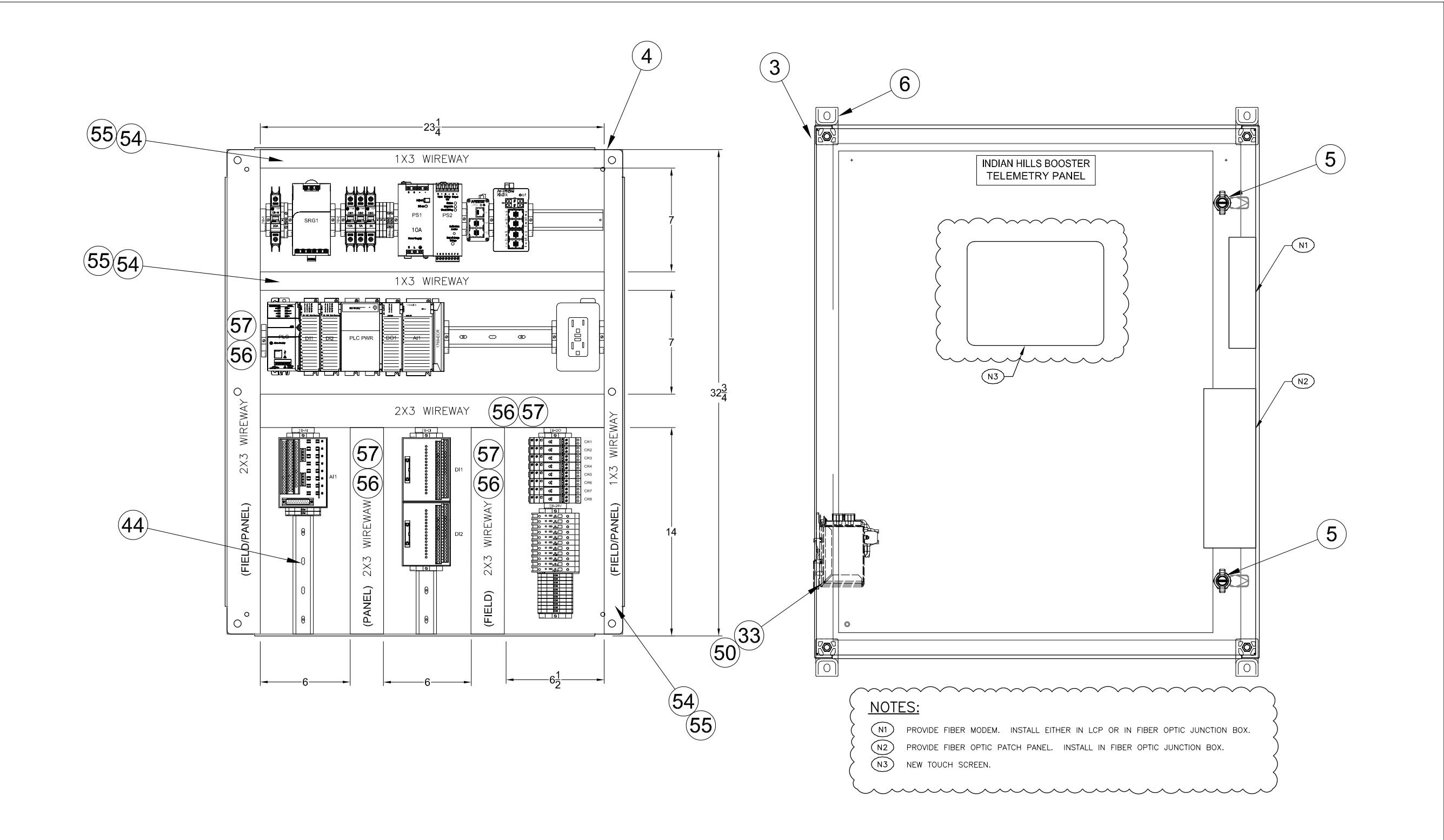
TAURUS
POWER & CONTROLS INC.
9999 S.W. Avery ST - Tualatin, Oregon 97062
Ph: (503) 692-9004 - FAX: (503) 692-9273

REV	DATE:	DESCRIPTION:	BY:	REV	DATE:	DESCRIPTION:	BY:
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0	08-24-2018	FINAL AS INSTALLED	KRW				

BY:	CHF
DATE:	09-01-2017
JOB NUMBER:	17-2132

TITLE: INDIAN HILLS BOOSTER TELEM. PANEL, PANEL LAYOUT			
WATER SYSTEM TELEMTRY UPGRADE		SCALE: 1:6	REV: 0
CITY OF MOSCOW		SHEET NO: IHB:P01	
MOSCOW, IDAHO			

CONTRACTOR INSTALLED, OWNER
PROVIDED PANEL. CLOUDED ITEMS
REQUIRE CONTRACTOR MODIFICATION OR
REVISION OF SUPPLIED CONTROL PANEL.



NOTES:

- N1 PROVIDE FIBER MODEM. INSTALL EITHER IN LCP OR IN FIBER OPTIC JUNCTION BOX.
- N2 PROVIDE FIBER OPTIC PATCH PANEL. INSTALL IN FIBER OPTIC JUNCTION BOX.
- N3 NEW TOUCH SCREEN.



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0	DESCRIPTION	DATE

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

LOCAL CONTROL PANEL "LCP-IHB" LAYOUT

FILE: M18131-E-701
JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:
E-701

Plot Date: 8/2/2022 1:52 PM Plotted By: Ted Schaefer
Date Created: 8/12/2020 3:03 PM User: JUB-MOSCOW BOOSTER STATIONS DRAWINGS M18131-E-703 DWG

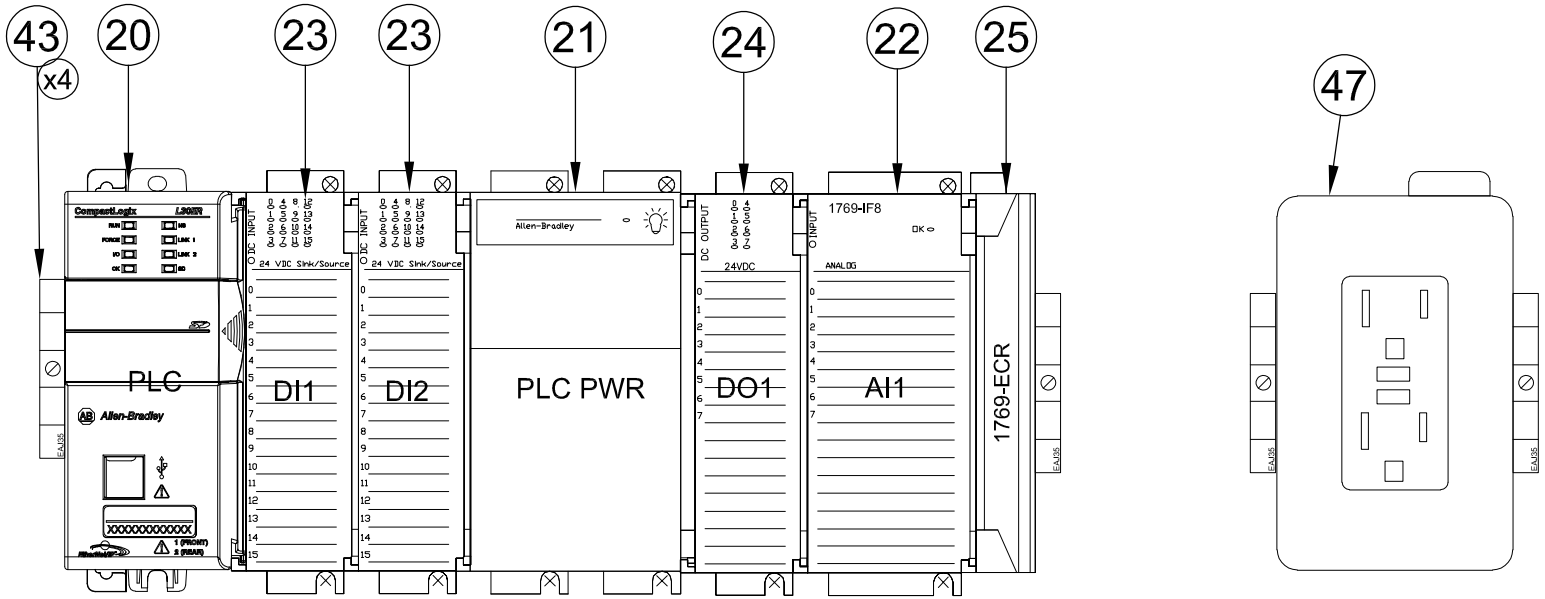
4.1 LOCAL CONTROL PANEL "LCP-IHB" DETAIL – SHEET 2
NOT TO SCALE



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0	08-24-2018	FINAL AS INSTALLED	KRW				

BY: CHF		JOB NUMBER: 17-2132		TITLE: INDIAN HILLS BOOSTER TELEM. PANEL, PANEL LAYOUT DETAIL B, PLC	
DATE: 09-01-2017				SCALE: 1:2	REV: 0
				SHEET NO: IHB:P03	
				CITY OF MOSCOW	
				MOSCOW, IDAHO	

CONTRACTOR INSTALLED, OWNER PROVIDED PANEL. CLOUDED ITEMS REQUIRE CONTRACTOR MODIFICATION OR REVISION OF SUPPLIED CONTROL PANEL.



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0	DATE: 08/11/22
NO.	BY: DATE

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

LOCAL CONTROL PANEL "LCP-IHB" DETAIL
SHEET 2

FILE: M18131-E-703
JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

E-703

Plot Date: 9/2/2022 1:53 PM Plotted By: Ted Schaefer
Date Created: 9/12/2020 3:03 PM User: JUB-MOSCOW BOOSTER STATIONS DRAWINGS M18131-E-704 DWG

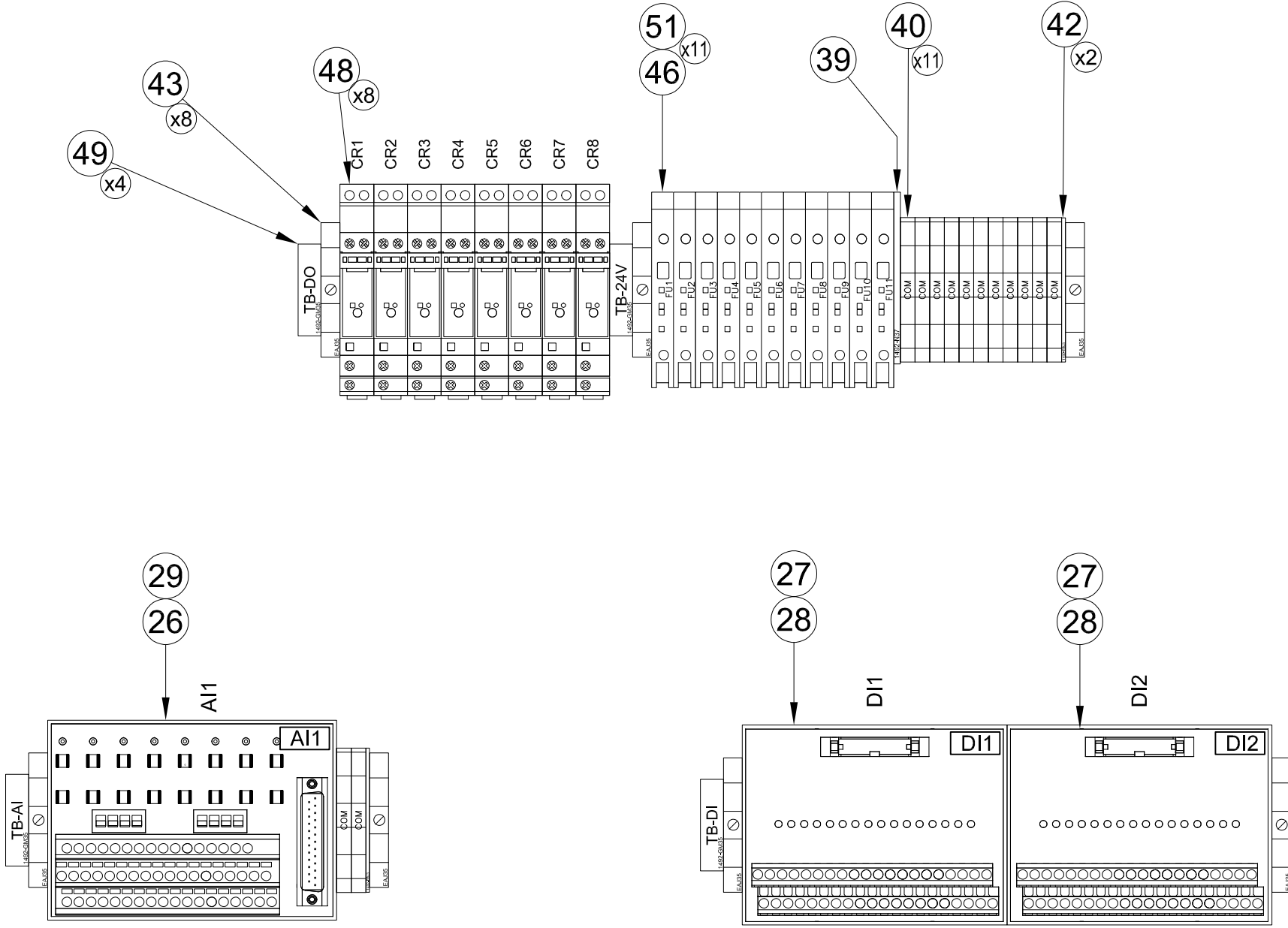
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NOT TO SCALE



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0	08-24-2018	FINAL AS INSTALLED	KRW				

BY:	CHF	DATE:	09-01-2017	JOB NUMBER:	17-2132	TITLE:	INDIAN HILLS BOOSTER TELEM. PANEL, PANEL LAYOUT DETAILS C,D, &E
							WATER SYSTEM TELEMETRY UPGRADE
							CITY OF MOSCOW
							MOSCOW, IDAHO
						SCALE:	1:2
						REV:	0
						SHEET NO:	IHB:P04

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1	FOR PERIOD
0	DATE
BY	DATE

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

LOCAL CONTROL PANEL "LCP-IHB" DETAIL
SHEET 3

FILE: M18131-E-704
JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/11/2022
SHEET NUMBER:

E-704

Plot Date: 9/2/2022 1:54 PM Plotted By: Ted Schaefer
Date Created: 03/20/2020 S:\0318\14331 - JUB - MOSCOW BOOSTER STATIONS\DRAWINGS\M18131-E-705.DWG

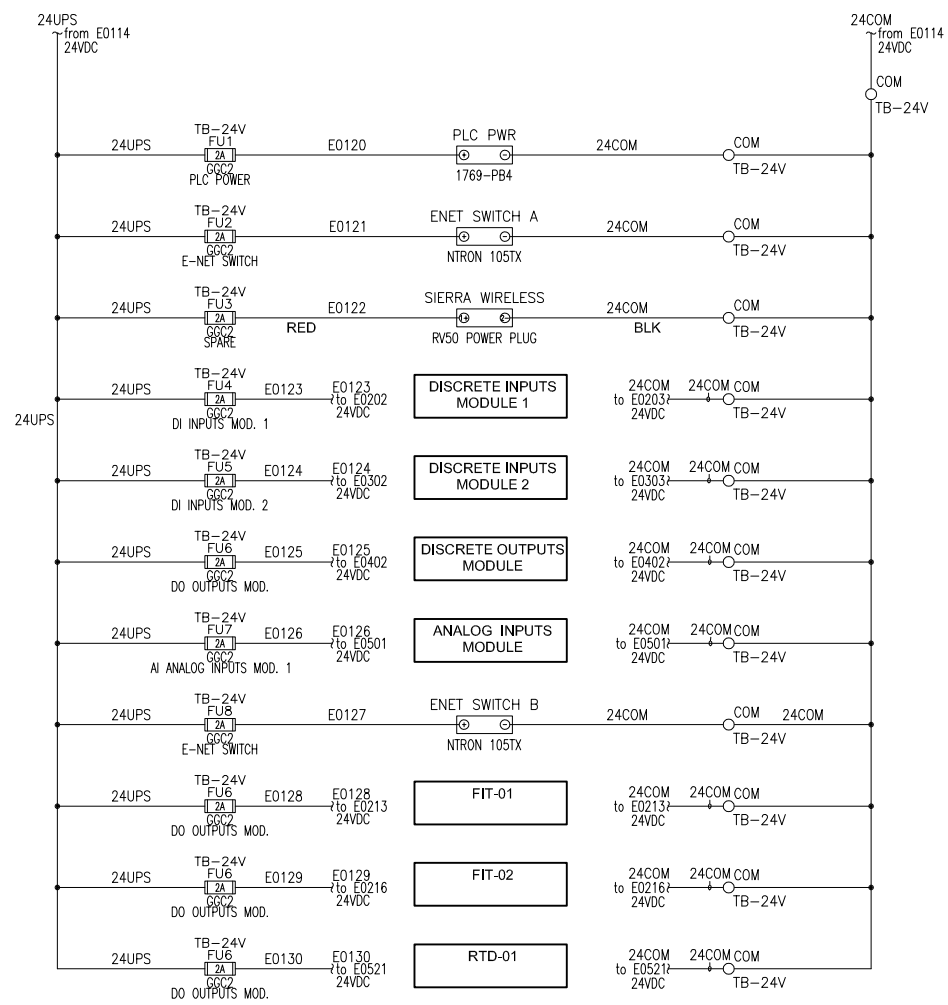
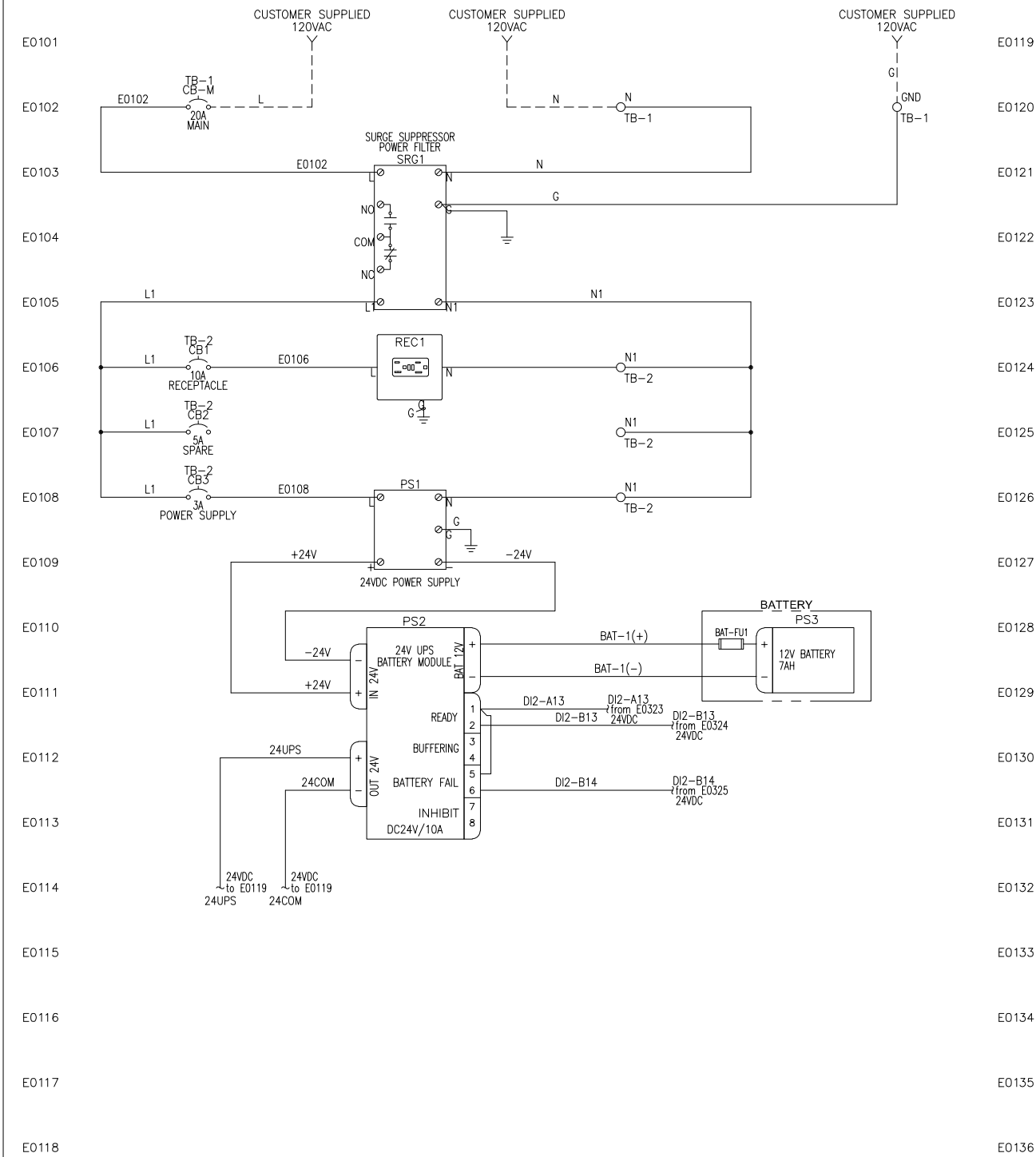
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NOT TO SCALE



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0	08-24-2018	FINAL AS INSTALLED	KRW				

BY: CHF		DATE: 09-01-2017		JOB NUMBER: 17-2132		TITLE: INDIAN HILLS BOOSTER TELEM. PANEL, CONTROL POWER SCHEMATIC	
SCALE: NTS		SHEET NO: IHB:E01		REV: 0		WATER SYSTEM TELEMETRY UPGRADE	
						CITY OF MOSCOW	
						MOSCOW, IDAHO	

OWNER PROVIDED PANEL. CONTRACTOR IS RESPONSIBLE FOR ALL FIELD WIRING AND TERMINATIONS.



WIRE COLOR CHART		
DESCRIPTION	WIRE COLOR	COLOR SYMBOL
120VAC CONTROL POWER	RED	RED
120VAC NEUTRAL	WHITE	WHT
GROUND	GREEN	GRN
DC HOT	PURPLE	PRP
DC COMMON	GRAY	GRY
FOREIGN VOLTAGES	YELLOW	YEL

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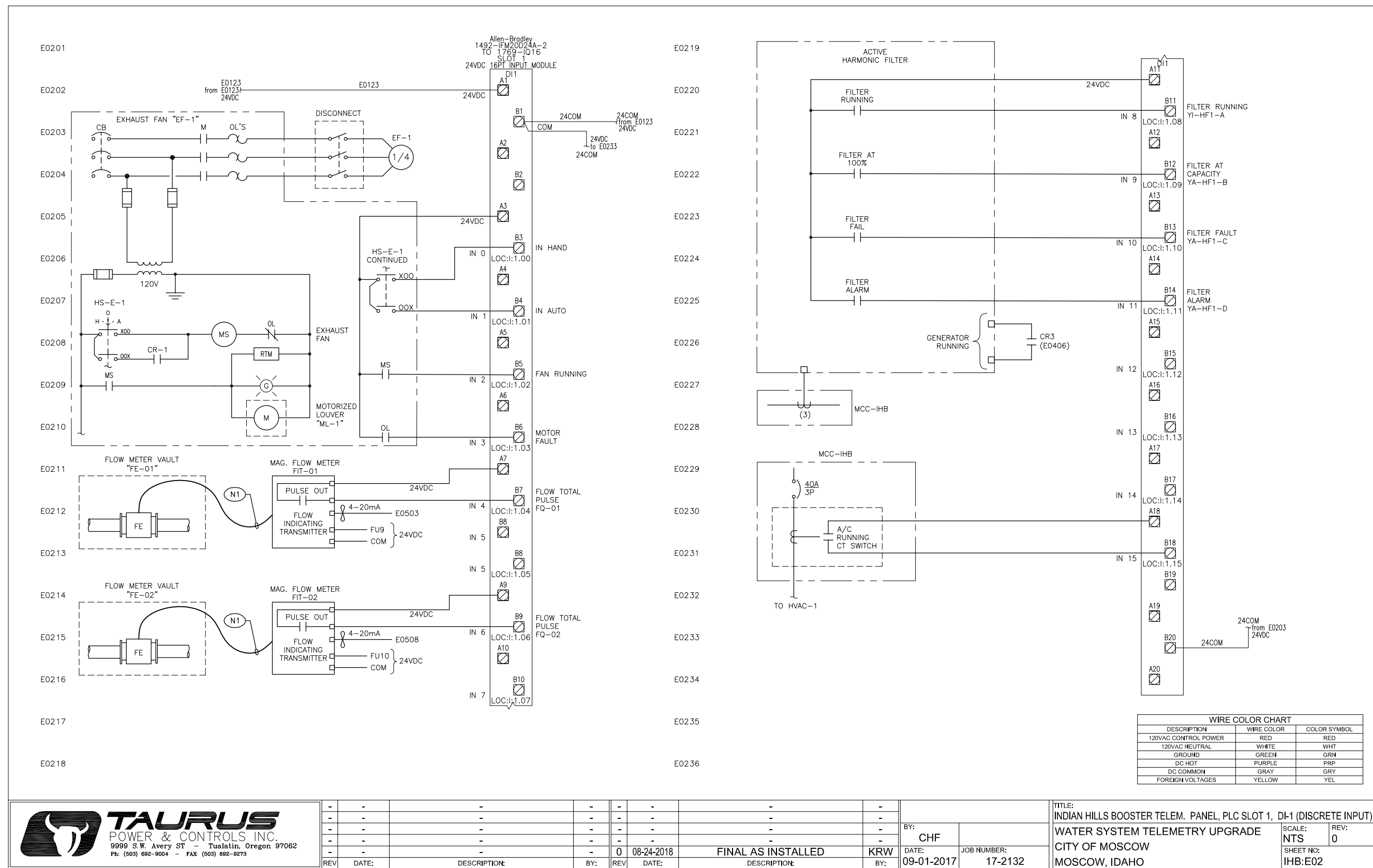
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0	08/11/22	TLB	
		DATE	

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

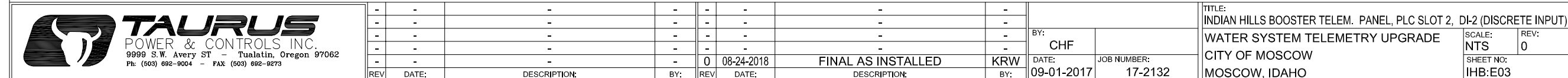
LOCAL CONTROL PANEL "LCP-IHB" SCHEMATIC
SHEET 1

FILE: M18131-E-705
JUB PROJ. #: 21-18-022
DRAWN BY: TLB
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

E-705



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IS RESPONSIBLE FOR ALL FIELD WIRING
AND TERMINATIONS.





OWNER PROVIDED PANEL. CONTRACTOR
IS RESPONSIBLE FOR ALL FIELD WIRING
AND TERMINATIONS.

Plot Date: 9/2/2022 1:56 PM Plotted By: Ted Schaeffer
Date Created: 2/23/2021 3:00 PM M1831 - JUB - MOSCOW BOOSTER STATION DRAWINGS M1831-E-709.DWG

4.1 LOCAL CONTROL PANEL "LCP-IHB" SCHEMATIC - SHEET 5
NOT TO SCALE

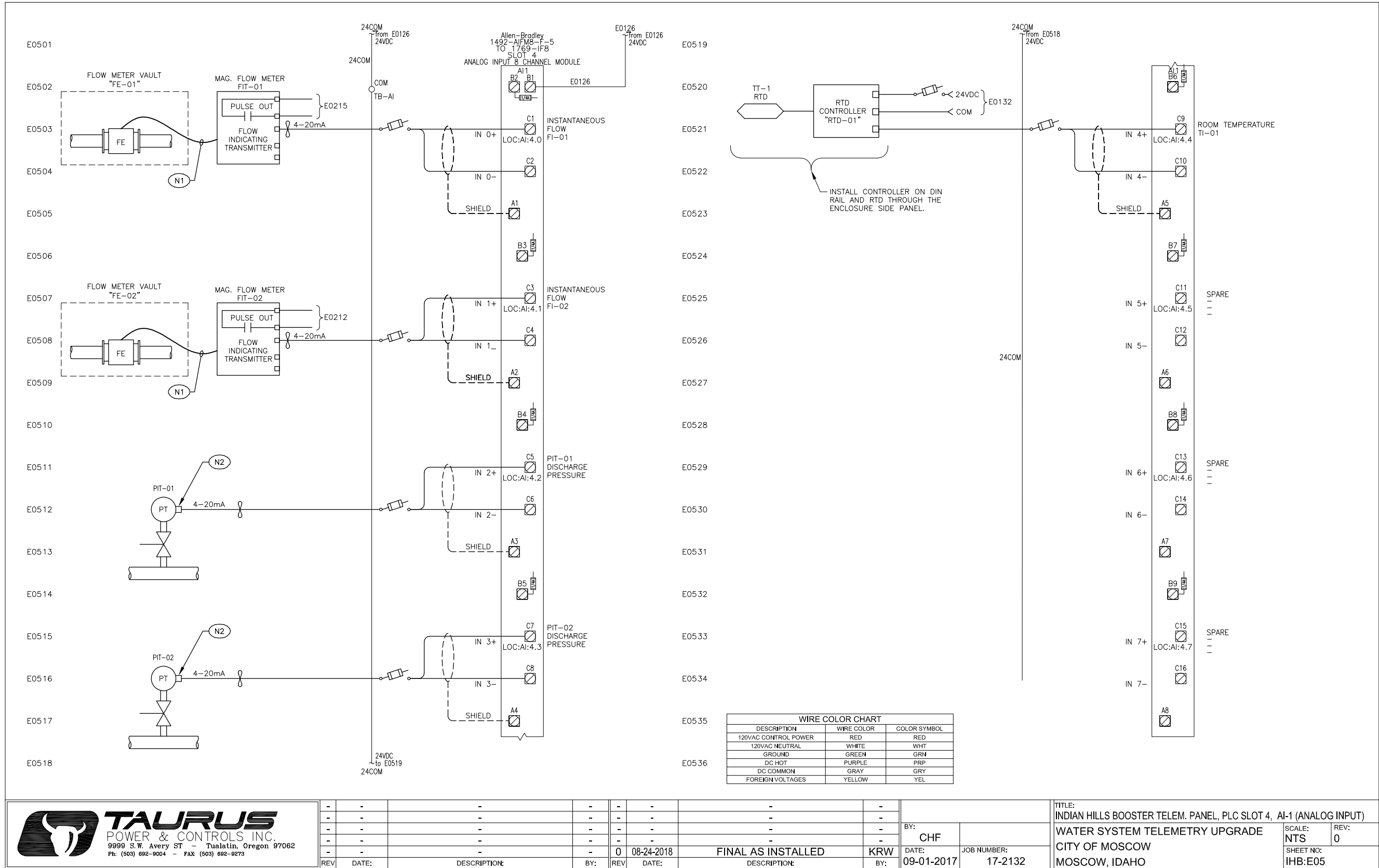


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-	-	-	-	-	-	-	-
0	08-24-2018	FINAL AS INSTALLED	KRW				

NOTES: (for this sheet)

- (N1) MANUFACTURER'S CABLE.
(N2) SHIELD LIFTED AND TAPED.

OWNER PROVIDED PANEL. CONTRACTOR IS RESPONSIBLE FOR ALL FIELD WIRING AND TERMINATIONS.



WIRE COLOR CHART		
DESCRIPTION	WIRE COLOR	COLOR SYMBOL
120VAC CONTROL POWER	RED	RED
120VAC NEUTRAL	WHITE	WHT
GROUND	GREEN	GRN
DC HOT	PURPLE	PRP
DC COMMON	GRAY	GRY
FOREIGN VOLTAGES	YELLOW	YEL

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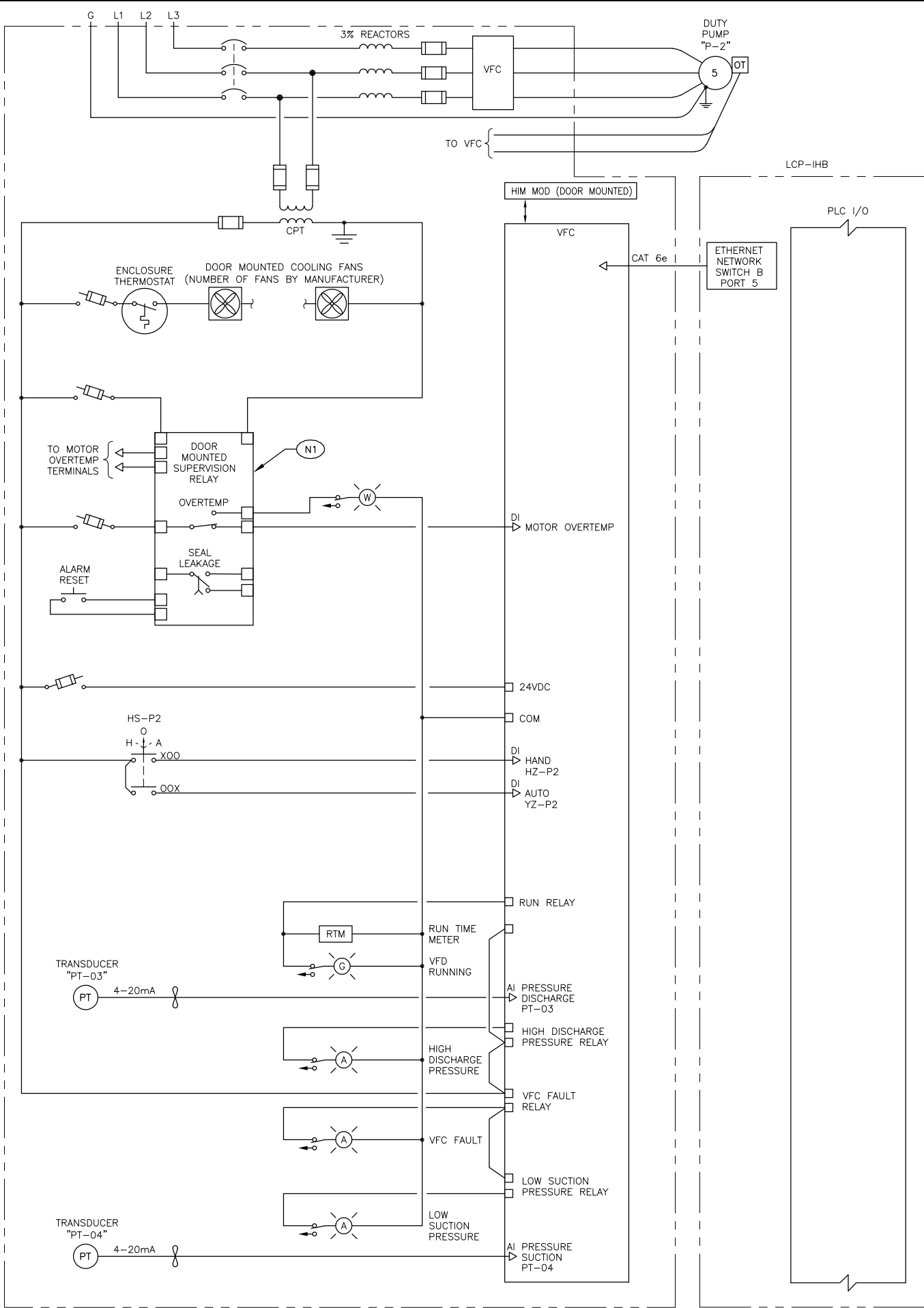
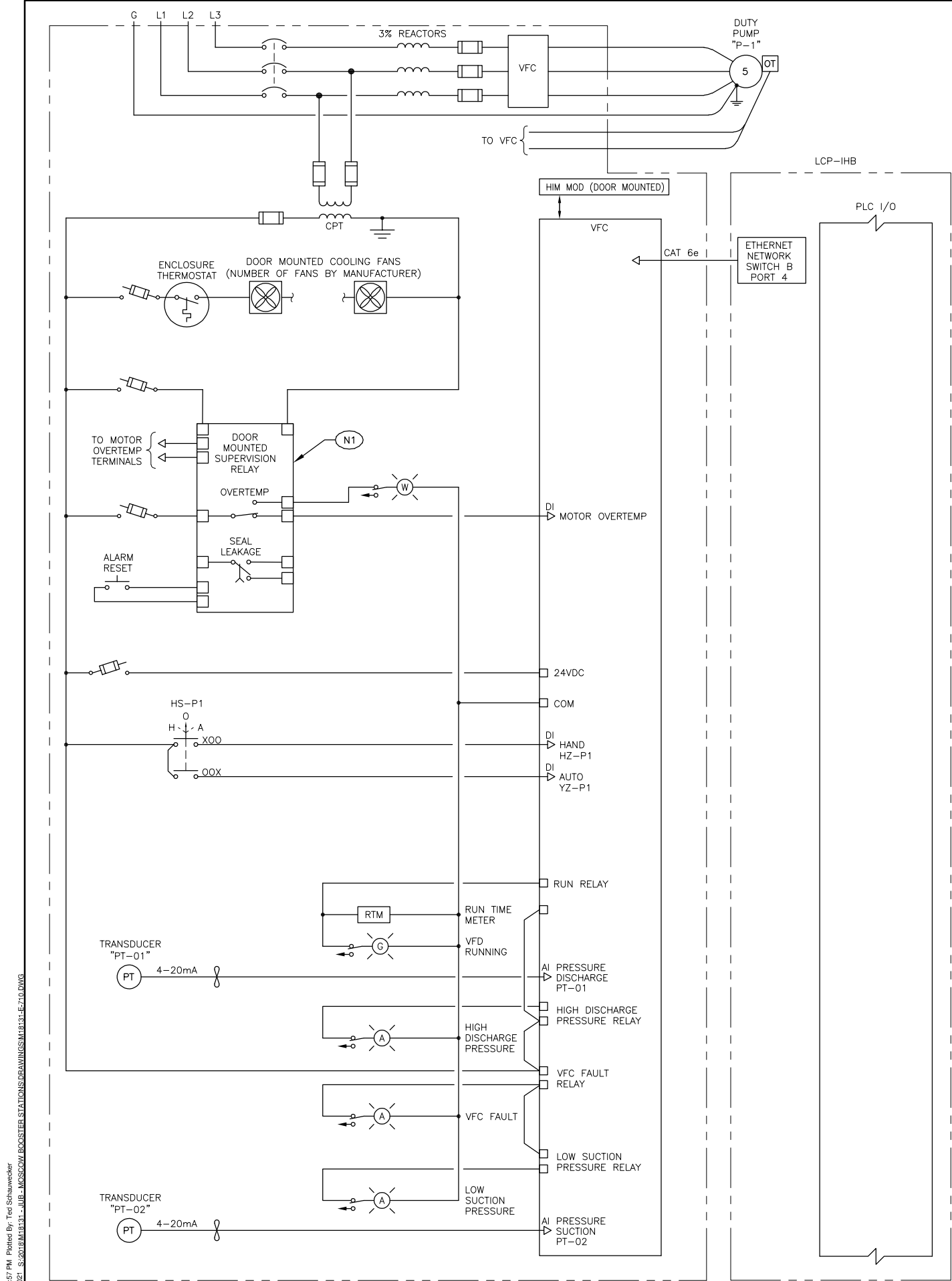
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	1	FOR REBID	08/11/22	TLB
	0	FOR REBID	08/11/22	TLB
	0	FOR REBID	08/11/22	TLB

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

LOCAL CONTROL PANEL "LCP-IHB" SCHEMATIC
SHEET 5

FILE: M18131-E-709
JUB PROJ. #: 21-18-022
DRAWN BY: TLB
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

E-709



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REVISION
NO. DESCRIPTION BY DATE
1 FOR REBID TJS/MLB 08/11/22
0 TJS/MLB 08/11/22
1 TJS/MLB 08/11/22

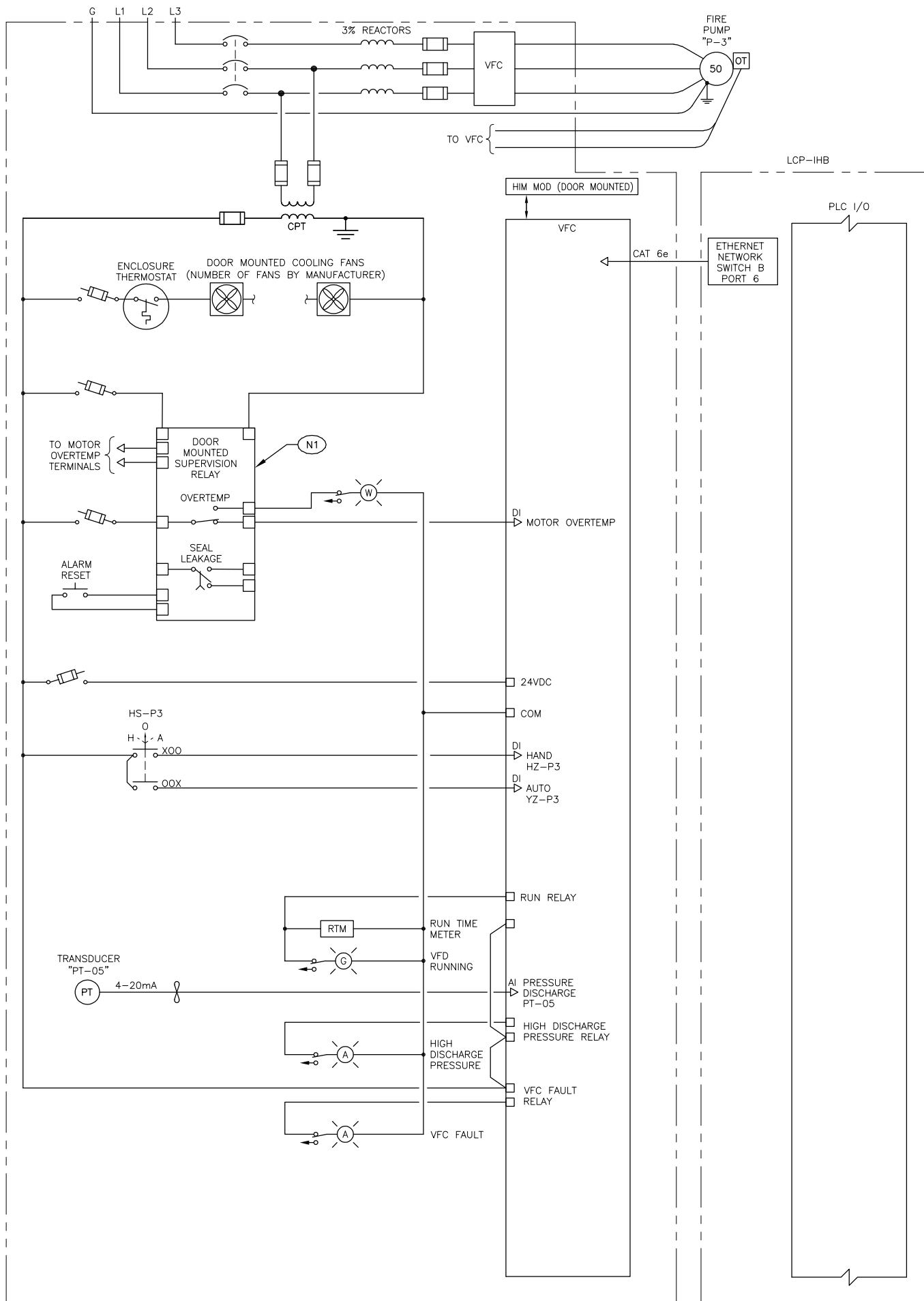
BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

INDIAN HILLS WIRING DIAGRAMS
SHEET 1

FILE: M18131-E-710
JUB PROJ. #: 21-18-022
DRAWN BY: TJS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

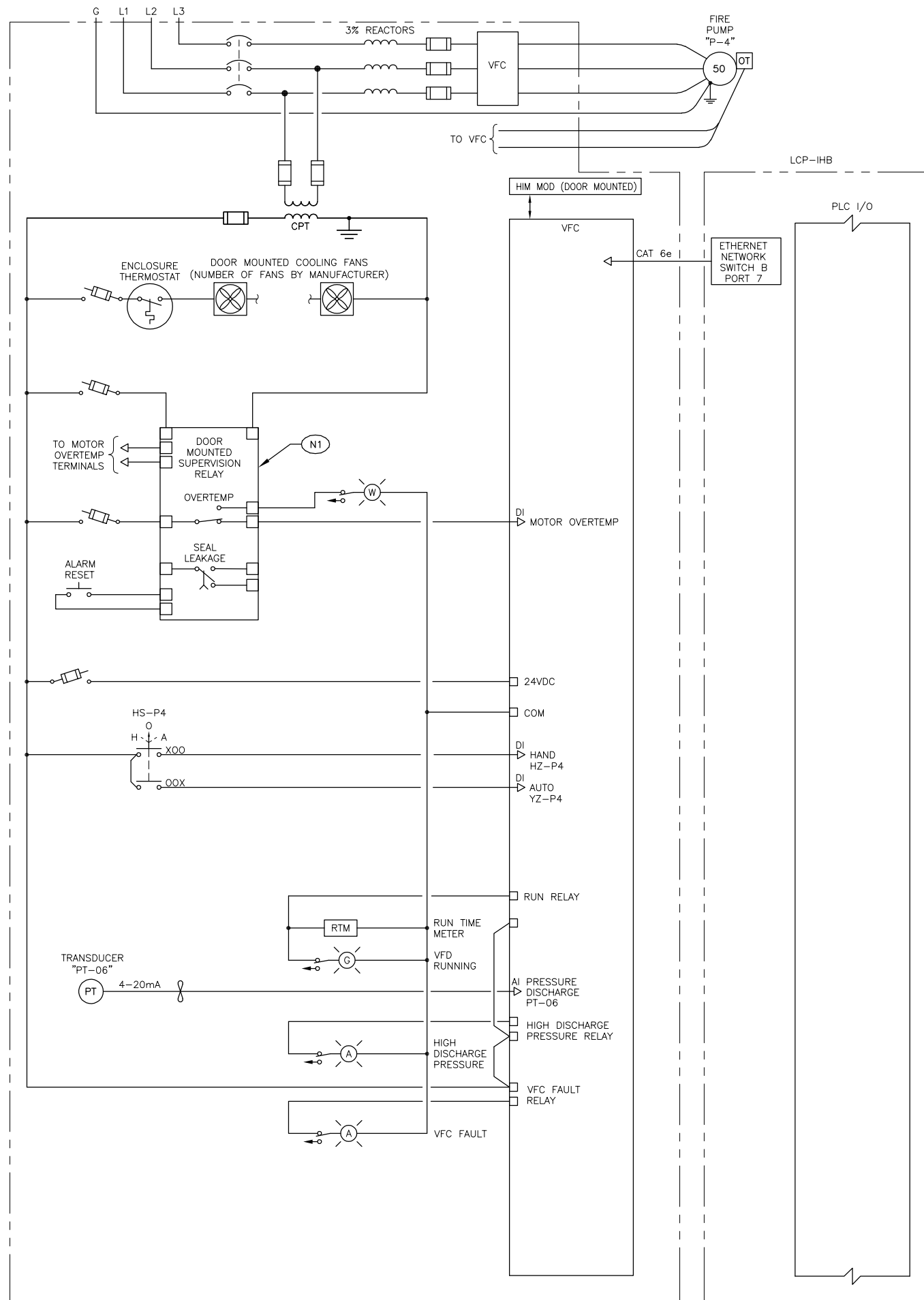
E-710

4.1 INDIAN HILLS WIRING DIAGRAMS – SHEET 2
NOT TO SCALE



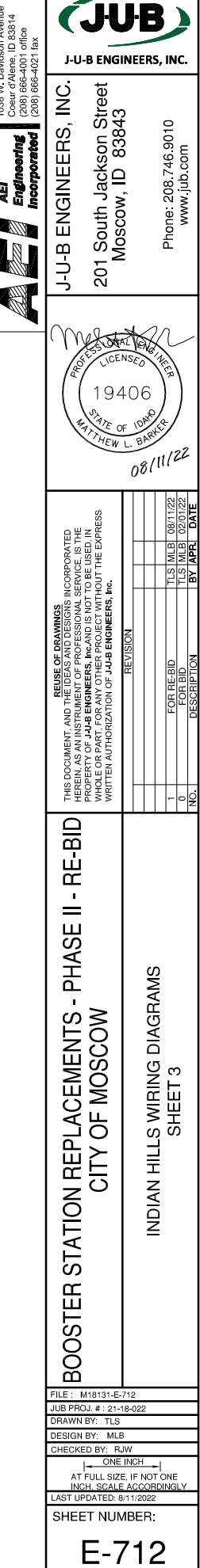
NOTES: (for this sheet)

(N1) PUMP SUPERVISION RELAY, MPE, PMP1, OR EQUAL.





(N1) PUMP SUPERVISION RELAY, MPE, PMP1, OR EQUAL.

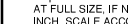


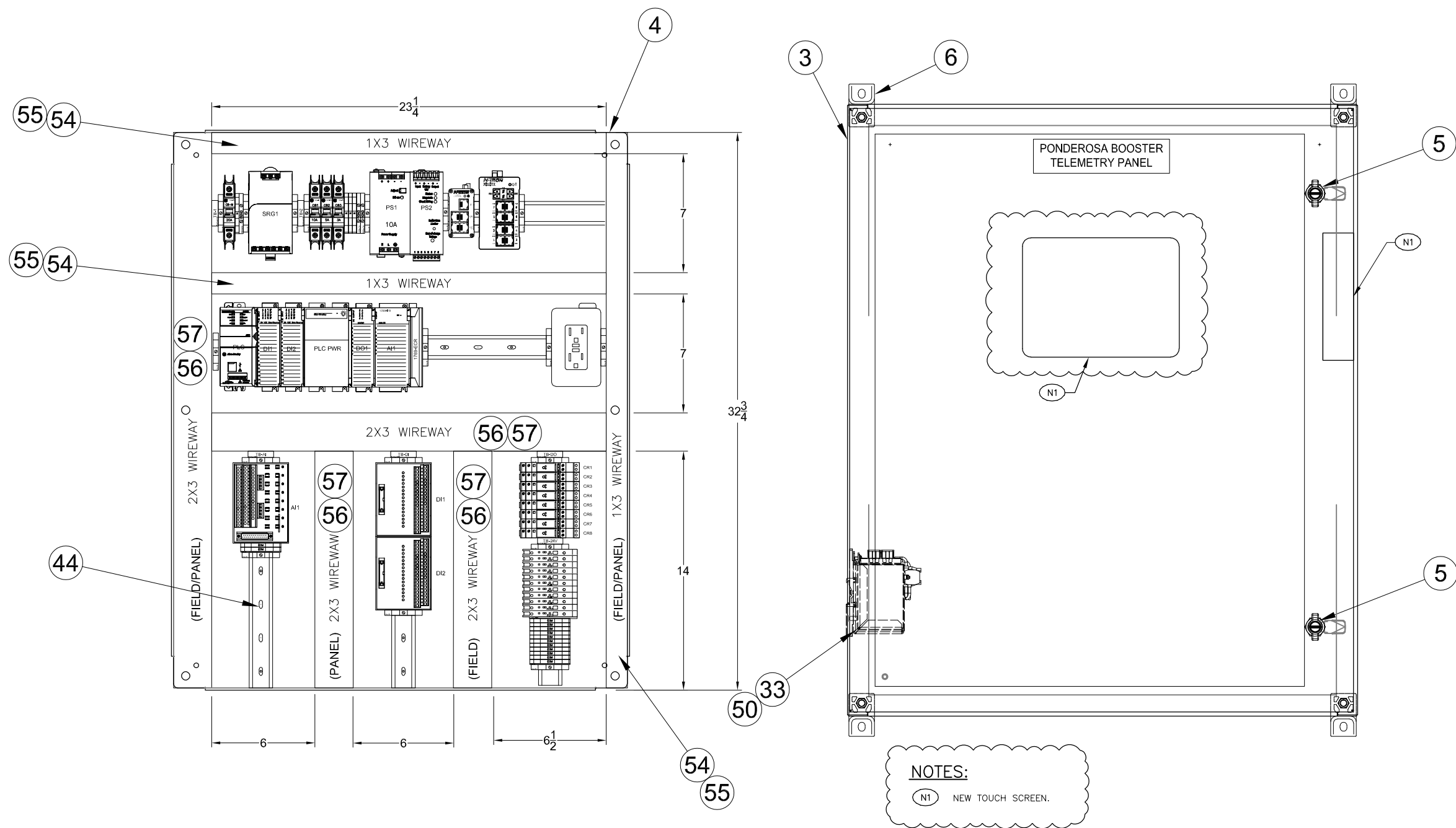
AEBI Engineering Incorporated	1038 W. Davidson Avenue Coeur d'Alene, ID 83814 (208) 666-4001 office (208) 666-4021 fax
J-U-B ENGINEERS, INC. 201 South Jackson Street Moscow, ID 83843	J-U-B ENGINEERS, INC. Phone: 208.746.9010 www.jub.com

[illegible]

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID CITY OF MOSCOW	LOCAL CONTROL PANEL "LCP-PB" SCHEDULES
--	---

		TITLE: PONDEROSA BOOSTER TELEM. PANEL, INDEX, PARTS LIST, FUSE TABLE	
BY:		WATER SYSTEM TELEMETRY UPGRADE CITY OF MOSCOW MOSCOW, IDAHO	SCALE: NTS
CHF			REV: 0
DATE: 09-01-2017	JOB NUMBER: 17-2132		SHEET NO: PNB-NG:G01

FILE#	M18131-E-750
JOB PROJ. #:	21-18-022
DRAWN BY:	TL5
DESIGN BY:	MLB
CHECKED BY:	RJW
	
LAST UPDATED: 8/11/2022	
SHEET NUMBER:	
E-750	



 TAURUS POWER & CONTROLS INC. 9999 S.W. Avery ST - Tualatin, Oregon 97062 Ph: (503) 692-9004 - FAX (503) 692-9273	-	-	-	-	-	-	-	TITLE: PONDEROSA BOOSTER TELEM. PANEL, PANEL LAYOUT WATER SYSTEM TELEMETRY UPGRADE CITY OF MOSCOW MOSCOW, IDAHO	SCALE: 1:6 REV: 0 SHEET NO: PNB:P01
	-	-	-	-	-	-	-		
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	-	-	-	-	-	-	-		
	-	-	-	-	-	-	-		
REV	DATE:	DESCRIPTION:	BY:	REV	DATE:	DESCRIPTION:	BY:	BY: CHF DATE: 08-24-2018 JOB NUMBER: 17-2132	
				0	08-24-2018	FINAL AS INSTALLED	KRW		

CONTRACTOR INSTALLED, OWNER PROVIDED PANEL. CLOUDED ITEMS REQUIRE CONTRACTOR MODIFICATION OR REVISION OF SUPPLIED CONTROL PANEL.

Plot Date: 02/20/2022 2:01 PM Plotted By: Ted Schaeffer
Date Created: 2/24/2021 3:00 PM M18131 - JUB - MOSCOW BOOSTER STATIONS DRAWINGS M18131-E-752.DWG

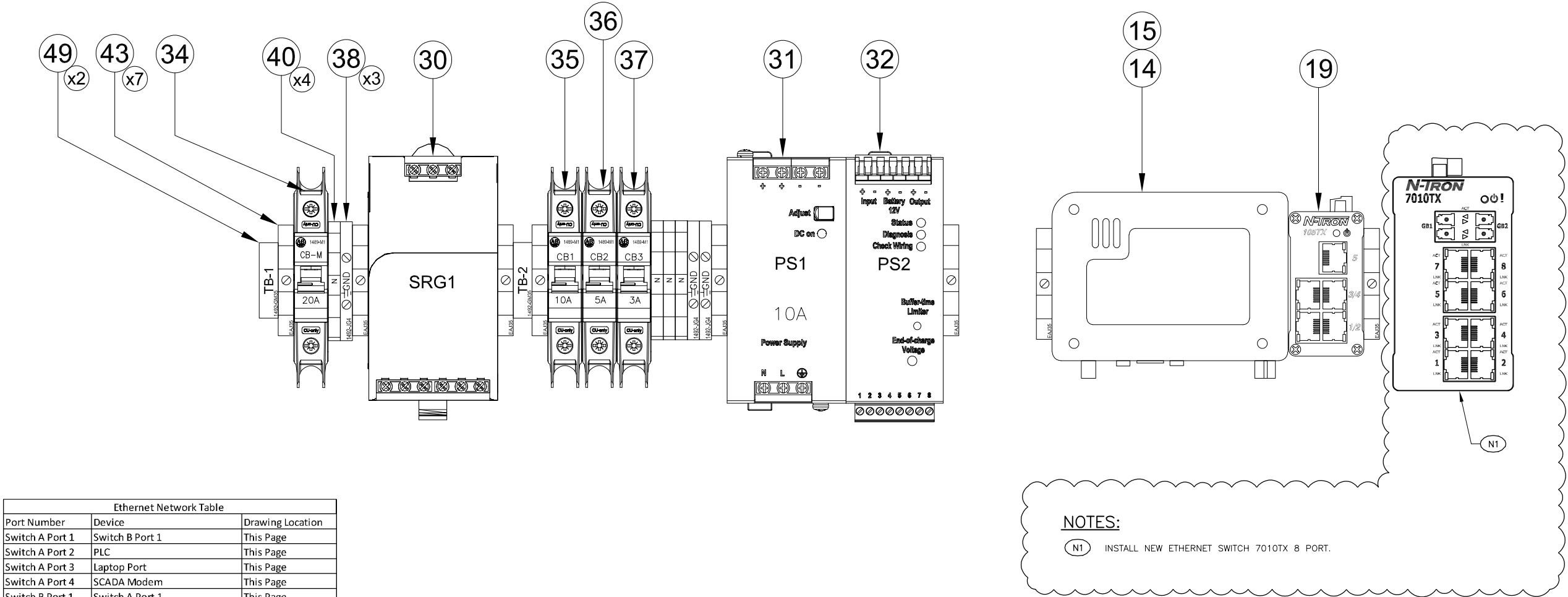
4.1 LOCAL CONTROL PANEL "LCP-PB" DETAIL - SHEET 1
NOT TO SCALE



REV	DATE:	DESCRIPTION:	BY:	REV	DATE:	DESCRIPTION:	BY:
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-	-	-	-	-	-	-	-
-	-	-	-	0	08-24-2018	FINAL AS INSTALLED	KRW

TITLE:		PONDEROSA BOOSTER TELEM. PANEL, PANEL LAYOUT DETAIL A	
BY:		CHF	
DATE:		09-01-2017	
JOB NUMBER:		17-2132	
SHEET NO:		PNB:P02	
SCALE:		1:2	
REV:		0	

CONTRACTOR INSTALLED, OWNER PROVIDED PANEL. CLOUDED ITEMS REQUIRE CONTRACTOR MODIFICATION OR REVISION OF SUPPLIED CONTROL PANEL.



Ethernet Network Table		
Port Number	Device	Drawing Location
Switch A Port 1	Switch B Port 1	This Page
Switch A Port 2	PLC	This Page
Switch A Port 3	Laptop Port	This Page
Switch A Port 4	SCADA Modem	This Page
Switch B Port 1	Switch A Port 1	This Page
Switch B Port 2	Standby Generator	E0311
Switch B Port 3	Power System Monitor (PSM)	E0323
Switch B Port 4	Duty Pump "P-1"	P-1 Pg 710
Switch B Port 5	Duty Pump "P-2"	P-2 Pg 710
Switch B Port 6	Fire Pump "P-3"	P-3 Pg 711
Switch B Port 7	Fire Pump "P-4"	P-4 Pg 711
Switch B Port 8	Jockey Pump "P-5"	p-5 Pg 712

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JUB Engineering, Inc. office
(208) 666-4021 Fax

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Matthew L. Barker
PROFESSIONAL ENGINEER
LICENSED
19406
STATE OF IDAHO
08/11/22

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REVISION	DATE	BY	DATE
1	08/11/22	TLB	
0		TLB	
		DESCRIPTION	

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

LOCAL CONTROL PANEL "LCP-PB" DETAIL
SHEET 1

FILE: M18131-E-752
JUB PROJ. #: 21-18-022
DRAWN BY: TLB
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

E-752

Plot Date: 02/24/2022 2:02 PM Plotted By: Ted Schaefer
Date Created: 2/24/2021 3:00 PM M1831 - JUB - MOSCOW BOOSTER STATIONS DRAWINGS M1831-E-753 DWG

4.1 LOCAL CONTROL PANEL "LCP-PB" DETAIL – SHEET 2
NOT TO SCALE

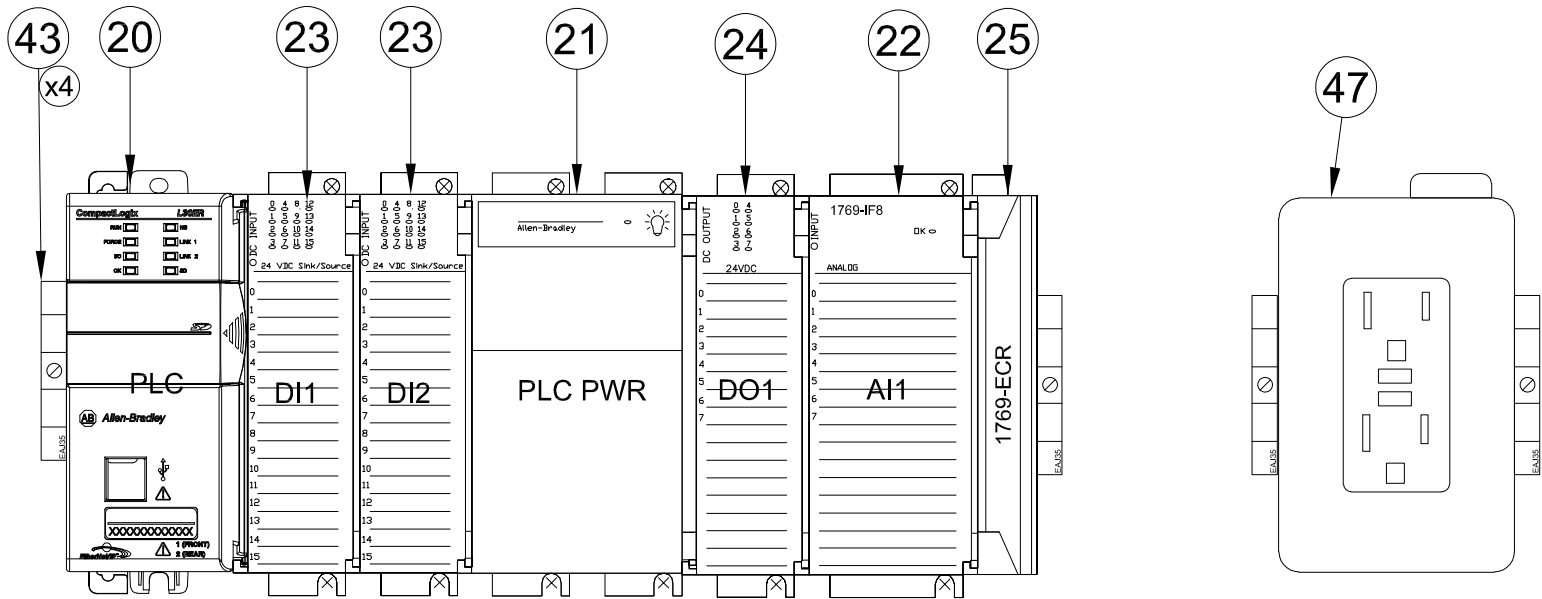


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9999 S.W. Avery ST - Tualatin, Oregon 97062
Ph: (503) 692-9004 - FAX: (503) 692-9273

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REV	DATE:	DESCRIPTION:	BY:	REV	DATE:	DESCRIPTION:	BY:
0	08-24-2018	FINAL AS INSTALLED	KRW				

BY: CHF	DATE: 09-01-2017	JOB NUMBER: 17-2132	TITLE: PONDEROSA BOOSTER TELEM. PANEL, PANEL LAYOUT DETAIL B, PLC
			WATER SYSTEM TELEMETRY UPGRADE
			CITY OF MOSCOW
			MOSCOW, IDAHO
			SCALE: 1:2
			REV: 0
			SHEET NO: PNB:P03

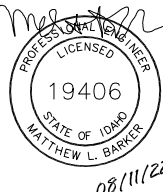
CONTRACTOR INSTALLED, OWNER PROVIDED PANEL. CLOUDED ITEMS REQUIRE CONTRACTOR MODIFICATION OR REVISION OF SUPPLIED CONTROL PANEL.



B PLC: ALLEN BRADLEY COMPACT LOGIX 1769
PNB-P01

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(208) 666-4021 office
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NO.	DESCRIPTION
1	FOR PERIOD
0	DATE
1	DATE

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

LOCAL CONTROL PANEL "LCP-PB" DETAIL
SHEET 2

FILE: M1831-E-753
JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:
E-753

Plot Date: 9/2/2022 2:02 PM Plotted By: Ted Schaefer
Date Created: 2/24/2021 3:03 PM M18131 - JUB - MOSCOW BOOSTER STATIONS DRAWINGS M18131-E-754 DWG

4.1 LOCAL CONTROL PANEL "LCP-PB" DETAIL - SHEET 3
NOT TO SCALE

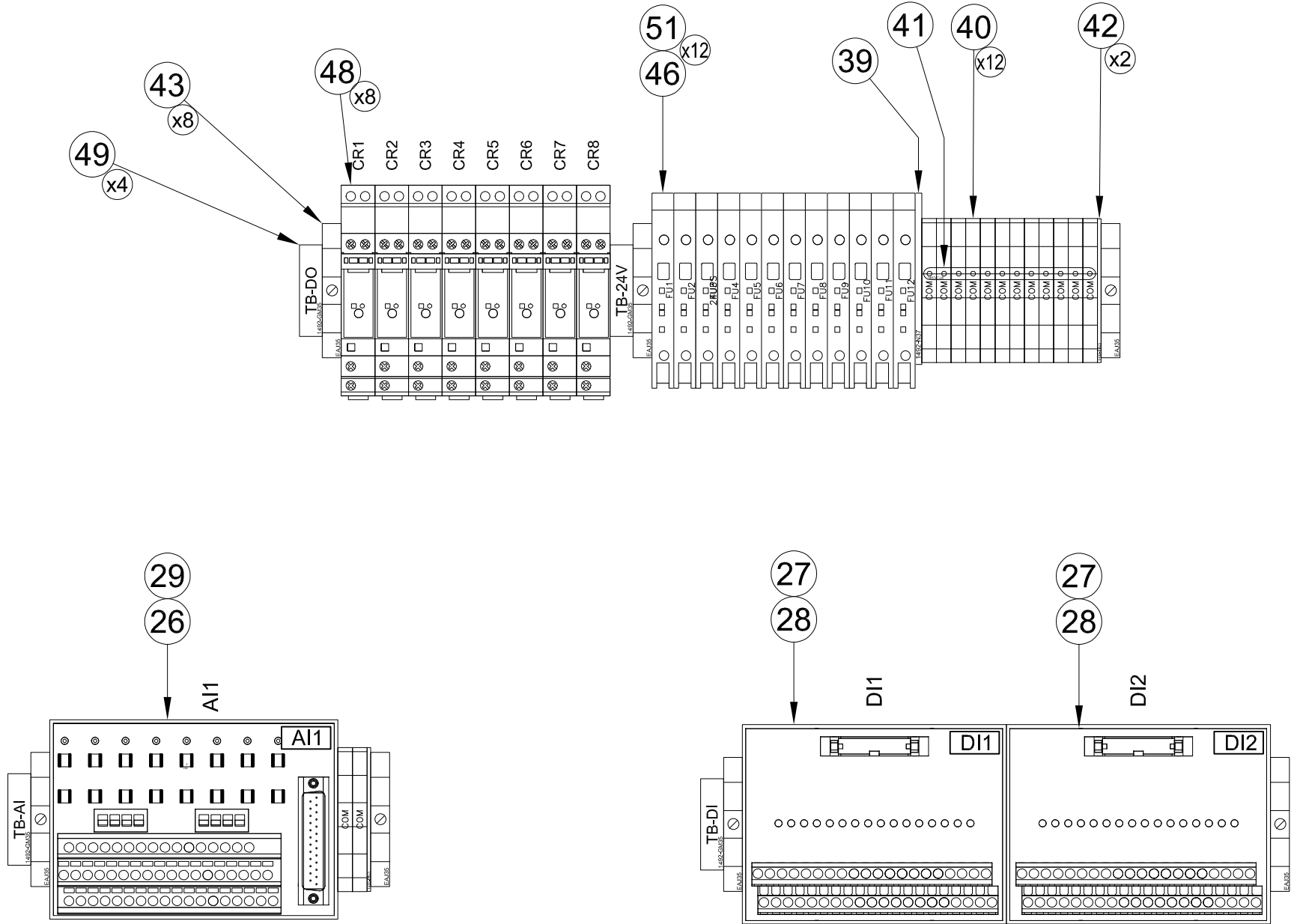


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-	-	-	-	-	-	-	-
0	08-24-2018	FINAL AS INSTALLED	KRW				

BY:	CHF
DATE:	09-01-2017
JOB NUMBER:	17-2132

TITLE: PONDEROSA BOOSTER TELEM. PANEL, PANEL LAYOUT DETAILS C,D,&E		
WATER SYSTEM TELEMTRY UPGRADE		
CITY OF MOSCOW		
MOSCOW, IDAHO		
SCALE: 1:2	REV: 0	
SHEET NO: PNB:P04		

CONTRACTOR INSTALLED, OWNER PROVIDED PANEL. CLOUDED ITEMS REQUIRE CONTRACTOR MODIFICATION OR REVISION OF SUPPLIED CONTROL PANEL.





OWNER PROVIDED PANEL. CONTRACTOR
IS RESPONSIBLE FOR ALL FIELD WIRING
AND TERMINATIONS.

Plot Date: 9/2/2022 2:08 PM Plotted By: Ted Schaefer
Date Created: 2/24/2021 S:\0318\1431 - JUB - MOSCOW BOOSTER STATION DRAWINGS\M18131-E-759.DWG

4.1

LOCAL CONTROL PANEL "LCP-PB" SCHEMATIC - SHEET 5
NOT TO SCALE

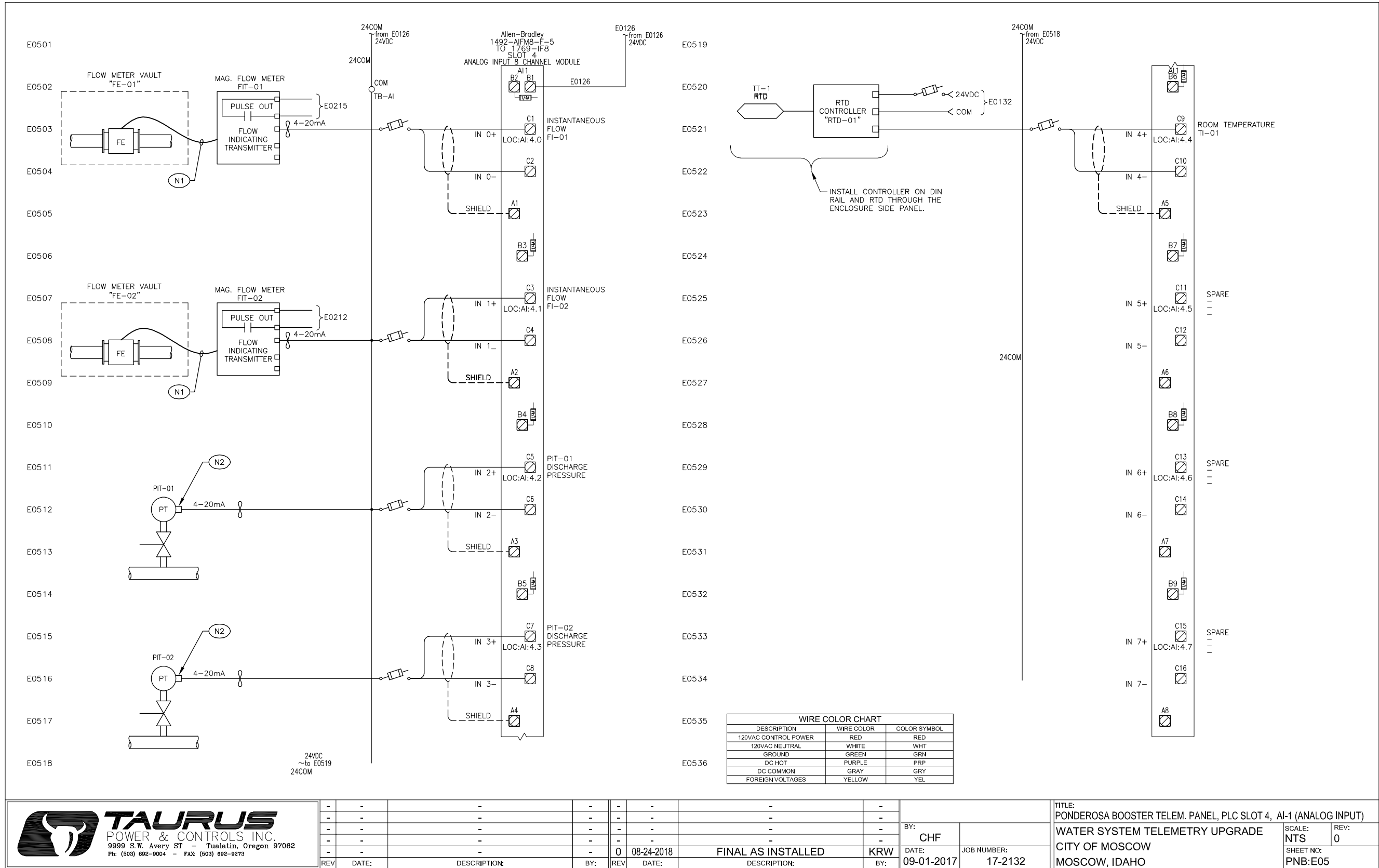


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-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
0	08-24-2018	FINAL AS INSTALLED	KRW				

NOTES: (for this sheet)

- (N1) MANUFACTURER'S CABLE.
(N2) SHIELD LIFTED AND TAPED.

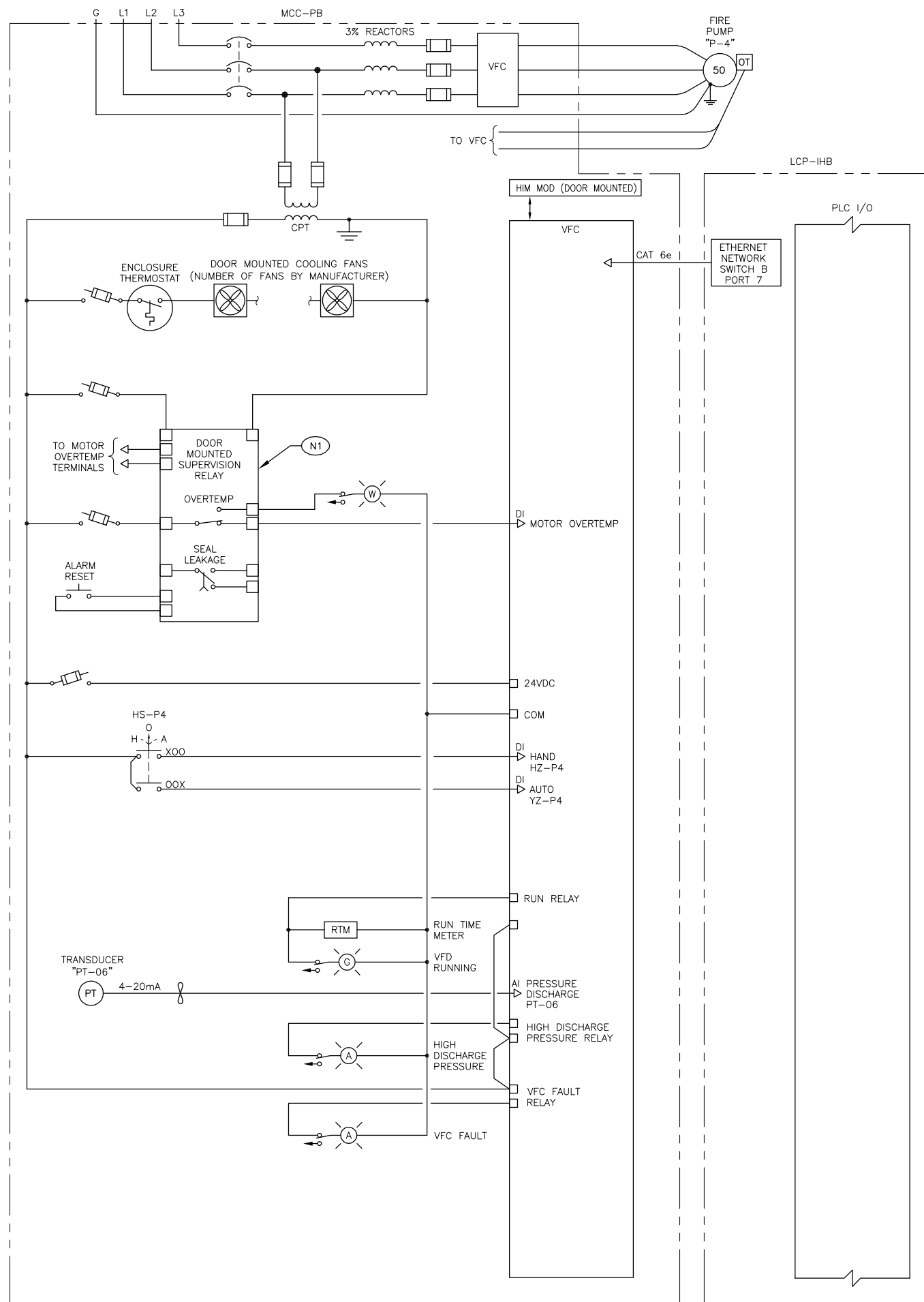
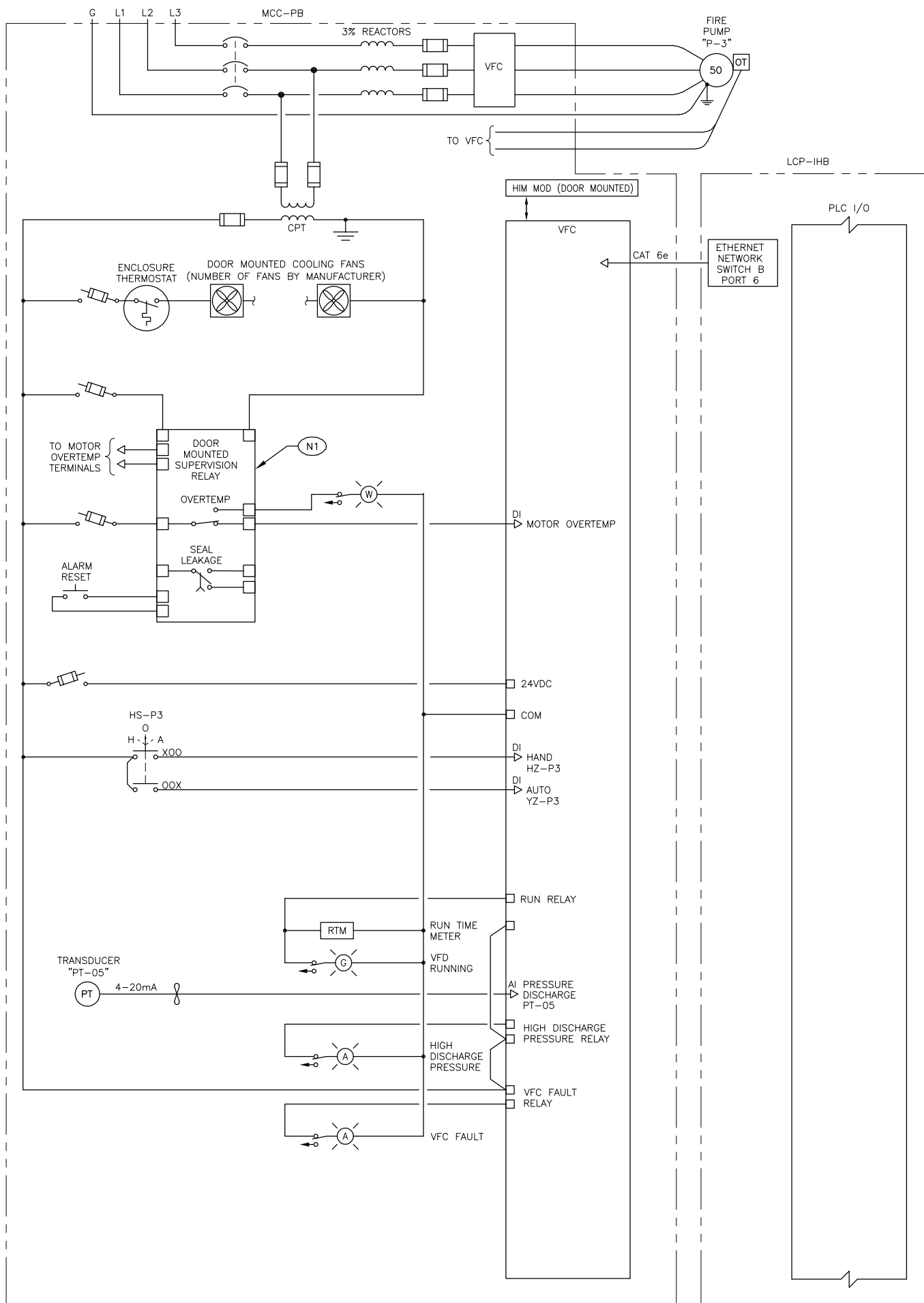
OWNER PROVIDED PANEL. CONTRACTOR IS RESPONSIBLE FOR ALL FIELD WIRING AND TERMINATIONS.



4.1 PONDEROSA WIRING DIAGRAMS – SHEET 2
NOT TO SCALE

NOTES: (for this sheet)

(N1) PUMP SUPERVISION RELAY, MPE, PMRI, OR EQUAL, MOUNTED IN FIELD PANEL.



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MATTHEW L. BARKER
08/11/22

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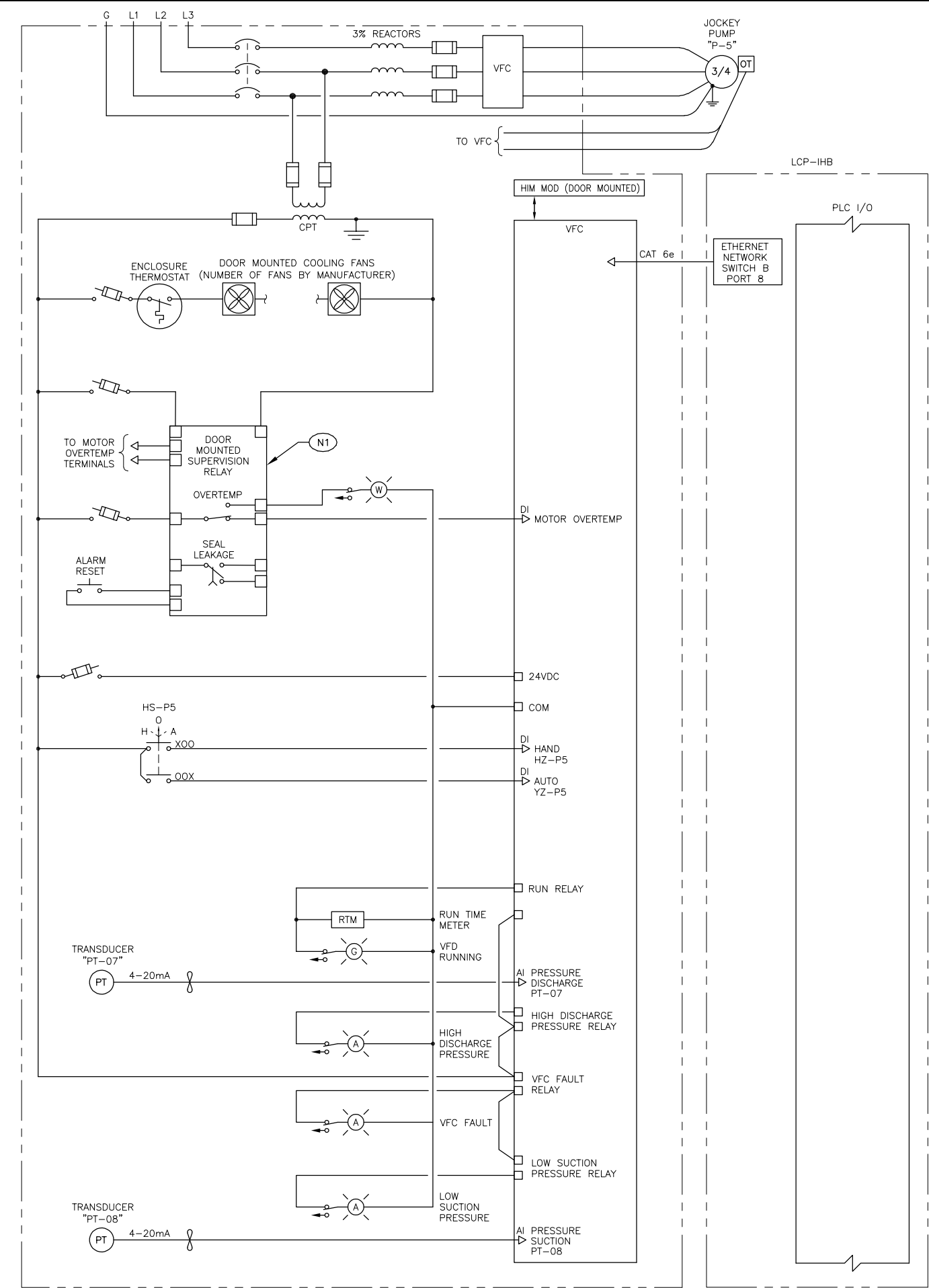
REVISION	
NO.	DATE
1	08/11/22
FOR REBID	08/11/22
DESCRIPTION	BY DATE

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

PONDEROSA WIRING DIAGRAMS
SHEET 2

FILE: M18131-E-761
JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

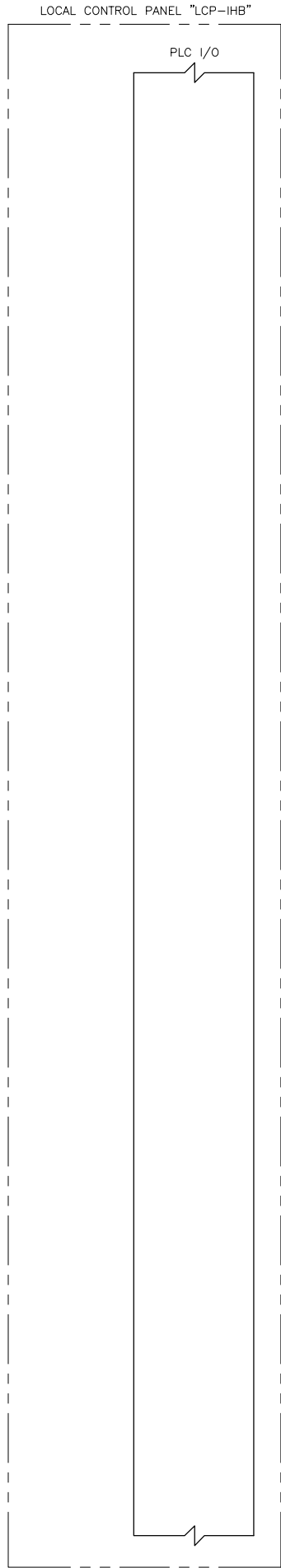
E-761



4.1 PONDEROSA WIRING DIAGRAMS – SHEET 3
NOT TO SCALE

NOTES: (for this sheet)

(N1) PUMP SUPERVISION RELAY, MPE, PMRI, OR EQUAL, MOUNTED IN FIELD PANEL.



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1	FOR REBID
0	DATE

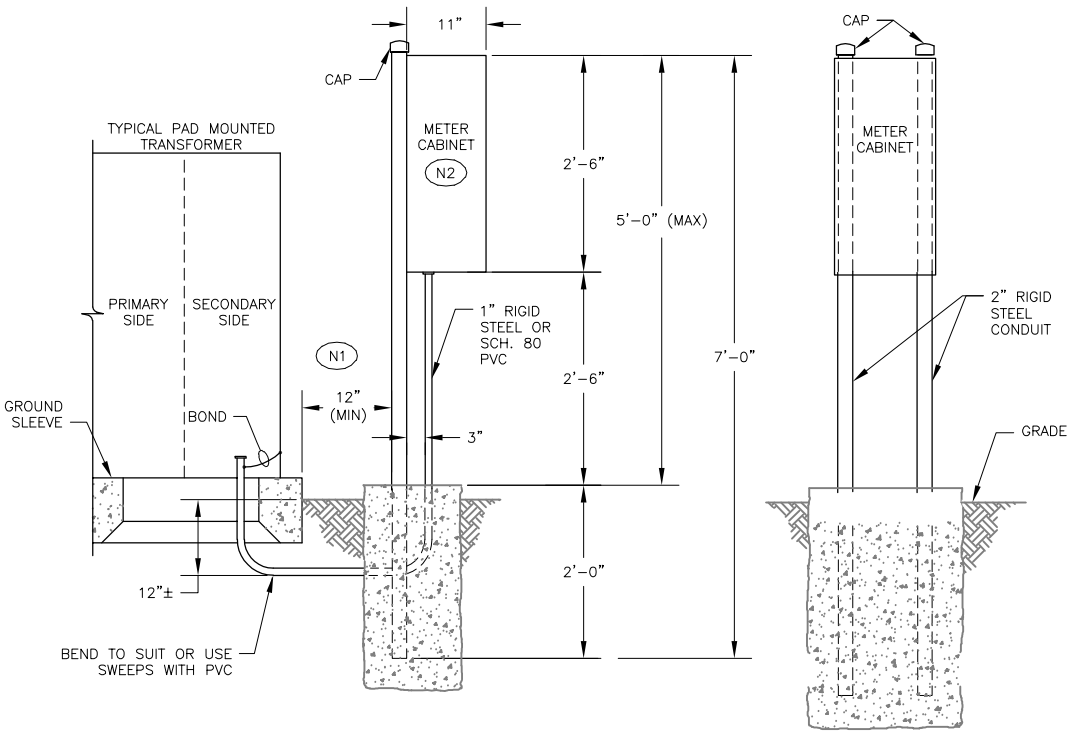
BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

PONDEROSA WIRING DIAGRAMS
SHEET 3

FILE : M18131-E-762
JUB PROJ. # : 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

E-762

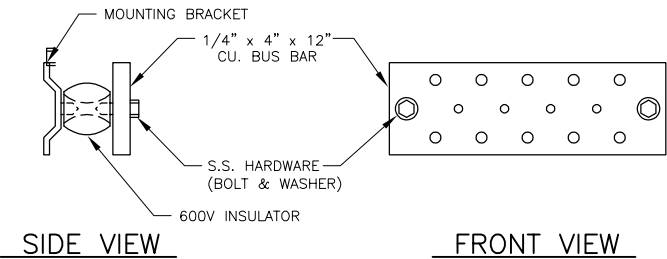
Plot Date: 5/2/2022 2:09 PM, Plotted By: Teri Schaeffer, Date Created: 5/12/2020, S:\0318\14331 - JUB - MOSCOW BOOSTER STATION\DRAWINGS\M18131-E-900.DWG



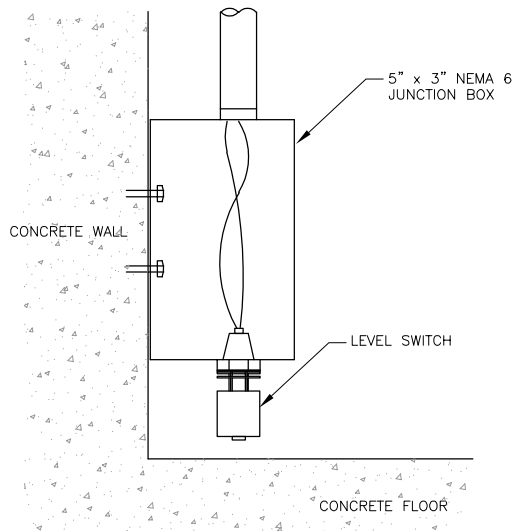
NOTES: (for this detail)

N1 COORDINATE METER LOCATION WITH ENGINEER DURING CONSTRUCTION. METER MAY BE LOCATED UP TO 25' FROM TRANSFORMER.

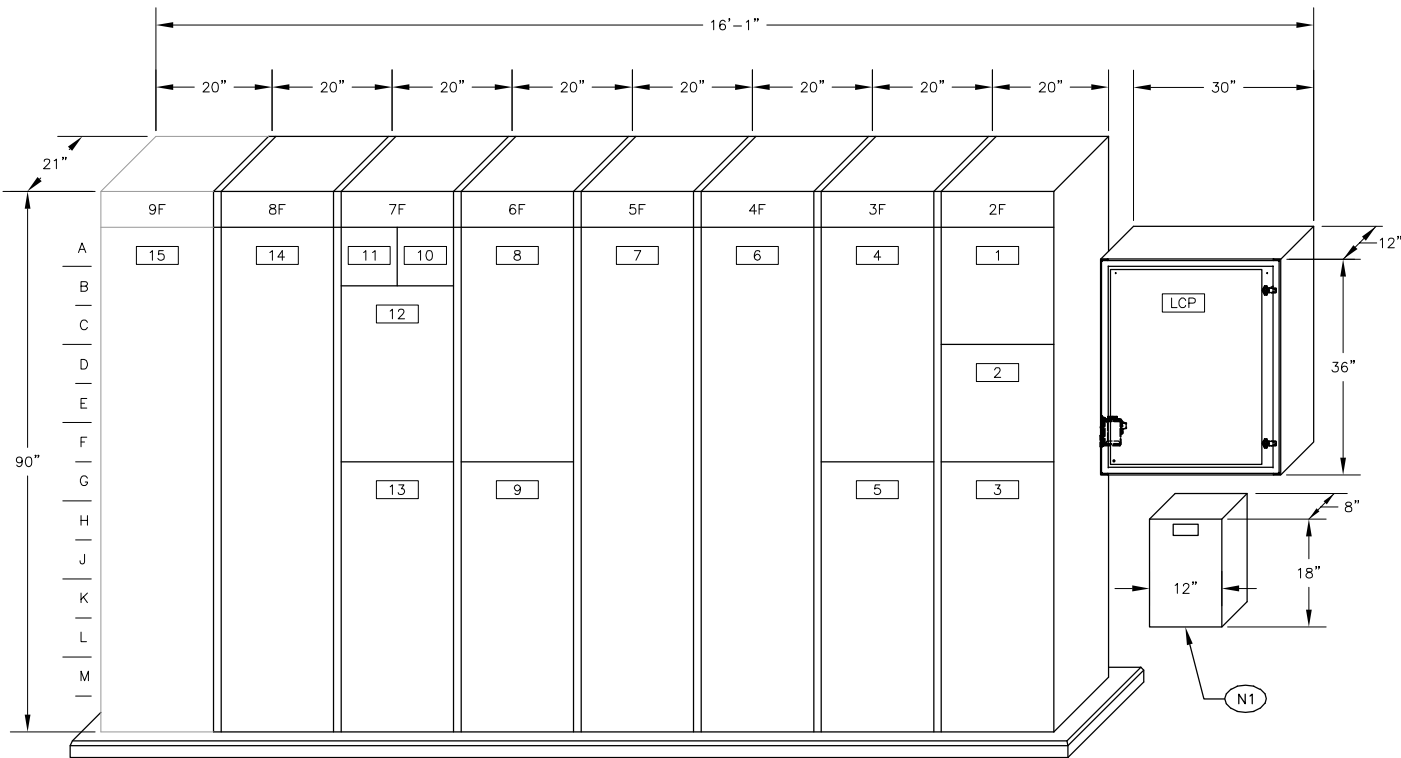
N2 METER CABINET PER UTILITY REQUIREMENTS.



1.2 GROUND BUS BAR DETAIL
NOT TO SCALE



2.2 TYPICAL FLOOD SWITCH DETAIL
NOT TO SCALE



NAMEPLATE SCHEDULE		
1	SPD	
2	DIGITAL POWER MONITOR	
3	MAIN LUGS	
4	DUTY PUMP P1	
5	DUTY PUMP P-1	
6	FIRE PUMP P-3	
7	FIRE PUMP P-4	
8	PLV PANELBOARD	
9	TRANSFORMER "T-LV"	
10	HVAC -1	
11	HARMONIC FILTER	
12	EXHAUST FAN EF-1	
13	JOCKEY PUMP P-5	
14	SPACE	

NOTES: (for this detail)

N1 FIBER OPTIC JUNCTION BOX

4.1 MOTOR CONTROL CENTER "MCC-IHB" ELEVATION DETAIL
NOT TO SCALE

4.3 NOT USED
NOT TO SCALE

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08/11/22

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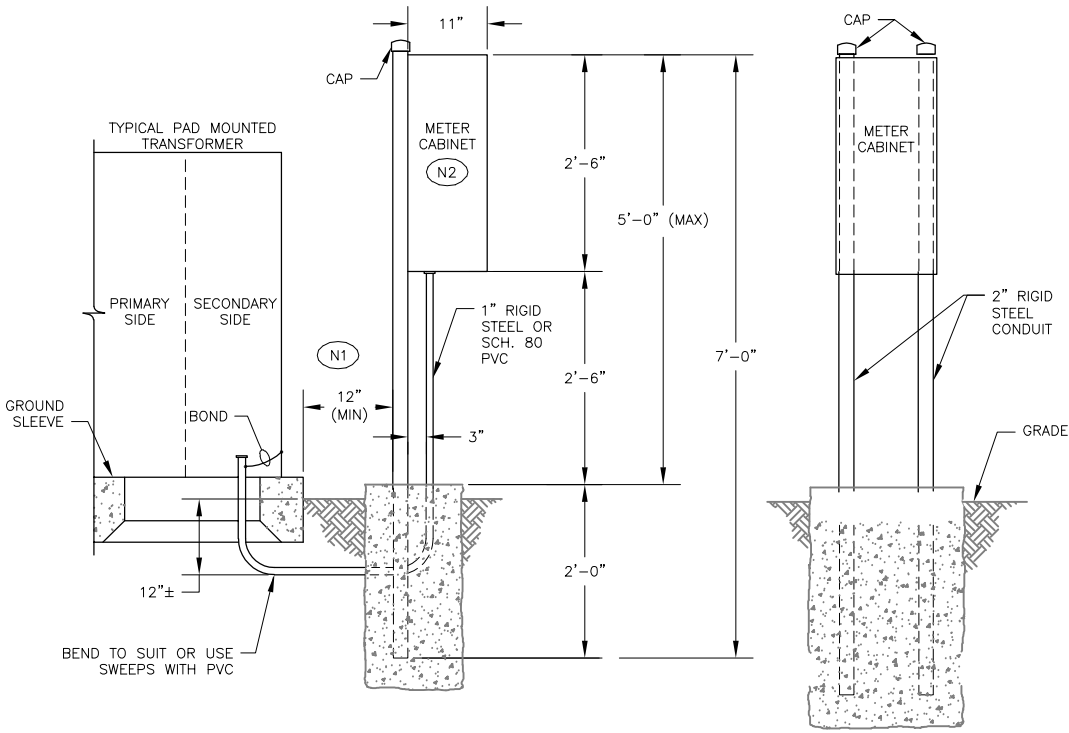
REVISION		DATE
1	FOR REBID	08/11/22
0	DESCRIPTION	BY: APRIL
NO.		

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

INDIAN HILLS ELECTRICAL DETAILS

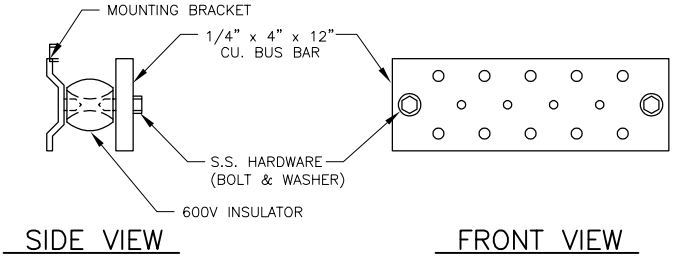
FILE: M18131-E-900
JUB PROJ. #: 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

E-900

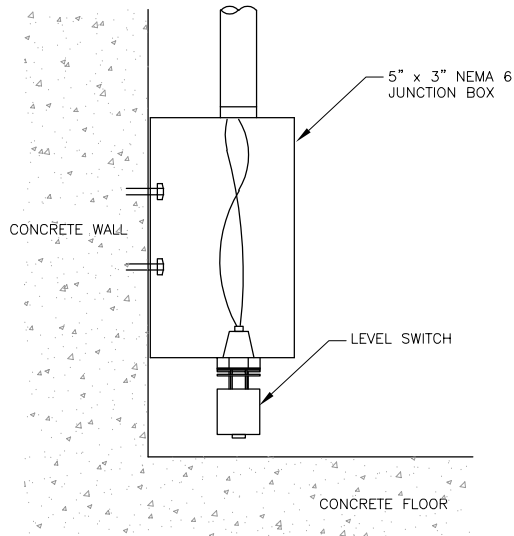


NOTES: (for this detail)

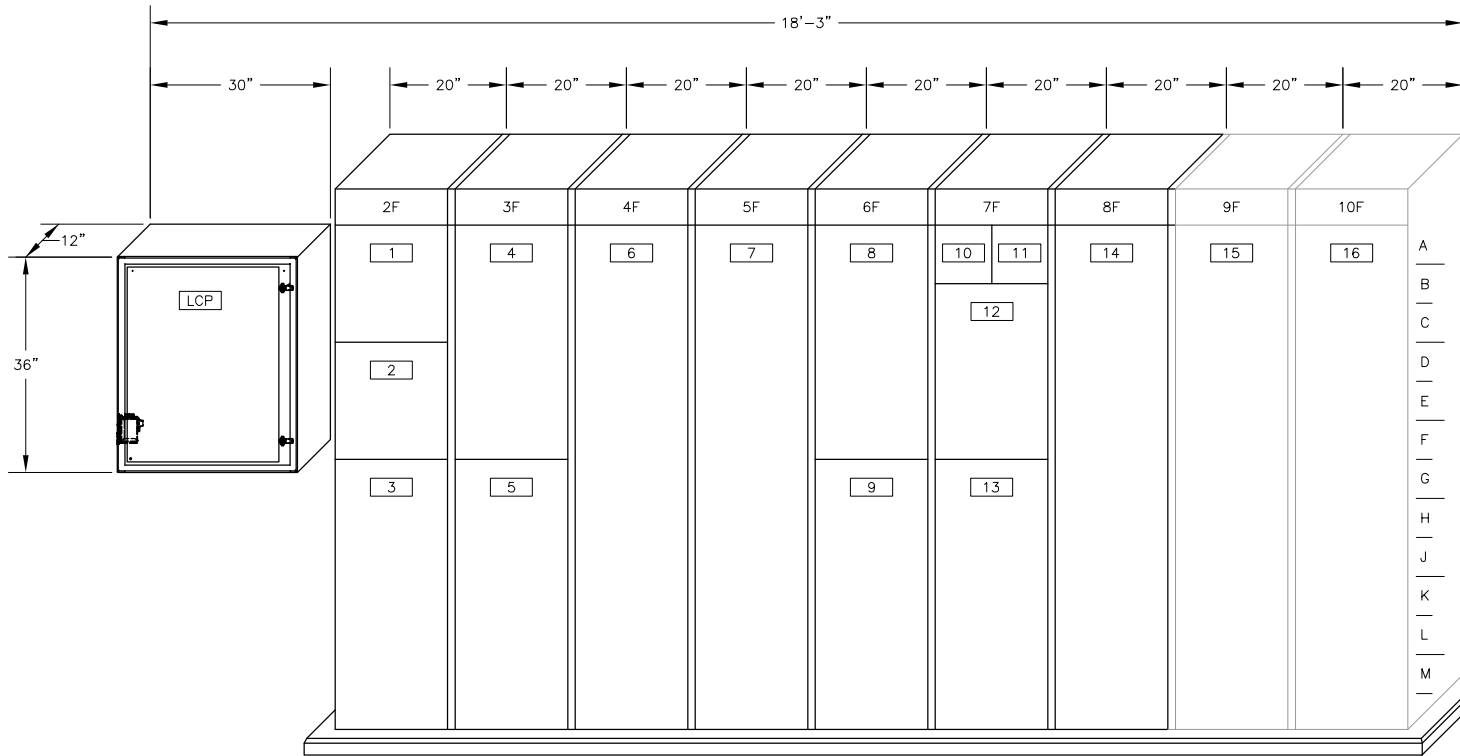
- (N1) COORDINATE METER LOCATION WITH ENGINEER DURING CONSTRUCTION. METER MAY BE LOCATED UP TO 25' FROM TRANSFORMER.
- (N2) METER CABINET PER UTILITY REQUIREMENTS.



1.2 GROUND BUS BAR DETAIL
NOT TO SCALE

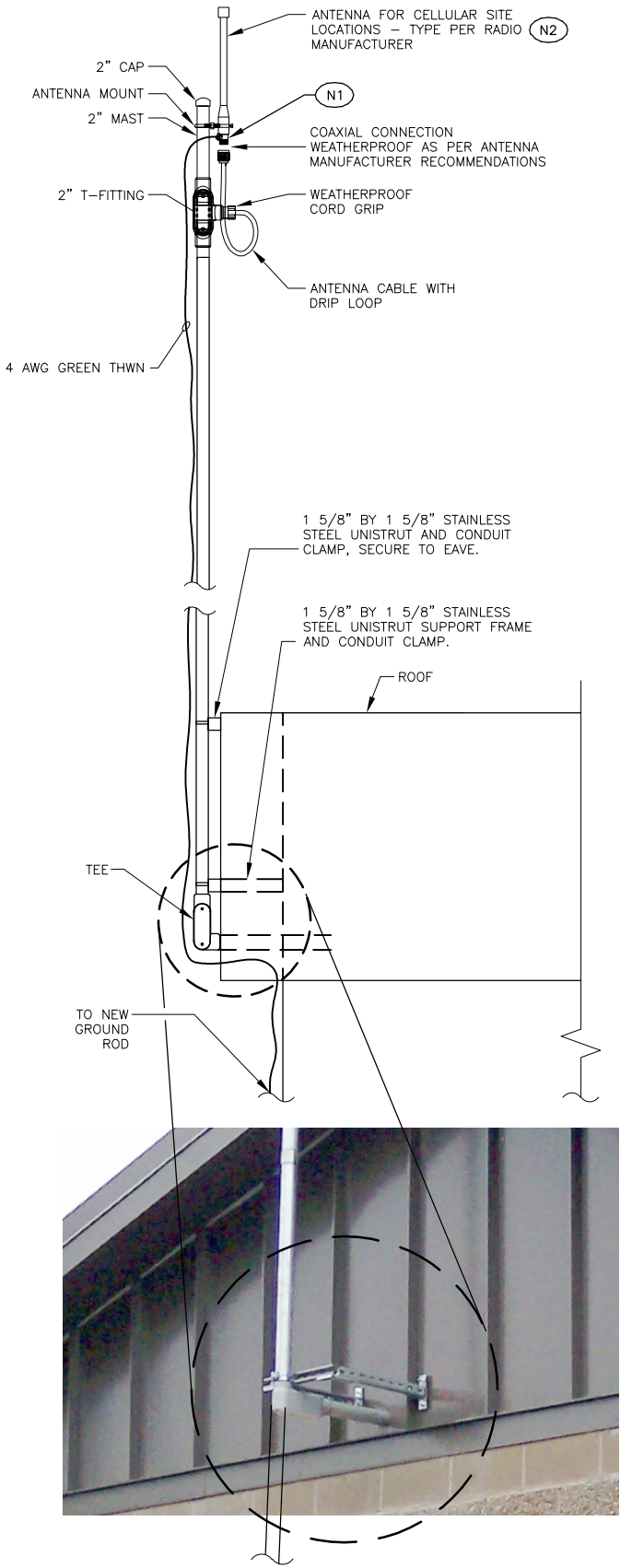


2.2 TYPICAL FLOOD SWITCH DETAIL
NOT TO SCALE



4.1 MOTOR CONTROL CENTER
"MCC-PB" ELEVATION DETAIL
NOT TO SCALE

NAMEPLATE SCHEDULE	
1	SPD
2	DIGITAL POWER MONITOR
3	MAIN LUGS
4	DUTY PUMP P-1
5	DUTY PUMP P-2
6	FIRE PUMP P-3
7	FIRE PUMP P-4
8	PLV PANELBOARD
9	TRANSFORMER "T-LV"
10	HVAC -1
11	HARMCNIC FILTER
12	EXHUAST FAN EF-1
13	JOCKEY PUMP P-5
14	FUTURE FIRE PUMP
15	FUTURE
16	FUTURE



NOTES: (for this detail)

- (N1) ANTENNA ASSEMBLY SHALL INCLUDE A LIGHTNING SURGE ARRESTOR AND CONNECTION TO EXISTING GROUND ROD OR ELECTRICAL SERVICE GROUNDING ELECTRODE SYSTEM. CONTRACTOR SHALL PROVIDE NEW GROUND RODS WHERE SUITABLE GROUNDING DOES NOT EXIST.
- (N2) ANTENNA SHALL BE MOUNTED AT, BUT NOT GREATER THAN , 7 METERS (20 FEET) ABOVE GROUND LEVEL.

4.3 ANTENNA MAST DETAIL
NOT TO SCALE

1038 W. Davidson Avenue
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(208) 666-4021 fax

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MATTHEW L. BARKER
08/11/22

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REVISION	DATE	BY	DATE
1	08/11/22	TLB	
0	08/11/22	TLB	
NO.	DESCRIPTION	BY	DATE

BOOSTER STATION REPLACEMENTS - PHASE II - RE-BID
CITY OF MOSCOW

PONDEROSA ELECTRICAL DETAILS

FILE : M18131-E-950
JUB PROJ. # : 21-18-022
DRAWN BY: TLS
DESIGN BY: MLB
CHECKED BY: RJW
AT FULL SIZE, IF NOT ONE
INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/11/2022
SHEET NUMBER:

E-950

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

City of Moscow Attn: City Clerk
504 S. Washington Street
Moscow, Idaho 83843

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged:

<u>Addendum No.</u>	<u>Addendum Date</u>
<u>Addendum 1</u>	<u>9/2/22</u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

- B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in SC-4.02 as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in SC-4.06 as containing reliable "technical data."
- E. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and

procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.

- F. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, test, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder safety precautions and programs incident thereto.
- G. Based on the information and observations referred to in Paragraph 3.01.E above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- H. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- I. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and is not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

BASE BID – BOOSTER STATION REPLACEMENT– PHASE II REBID

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
1	Indian Hills Booster Pump Station	1	LS	\$ 2,081,000	\$ 2,081,000.00
2	Ponderosa Booster Pump Station	1	LS	\$ 2,150,000	\$ 2,150,000.00
BASE BID TOTAL					\$ 4,231,000

BASE BID TOTAL PRICE four million two hundred thirty one thousand
(use words)

- 5.02 Major Equipment Items: Certain items of major equipment to be provided under this Contract are tabulated in the Schedule of Manufacturers and Suppliers of Major Equipment and Material Items. In connection with the tabulation of major items of equipment included in the lump sum base bid, the following shall apply:
- A. The lump sum bid shall include the installed prices from those manufacturers listed by the Owner as "Base Bid."
 - B. Bidder may include prices for listed alternate manufacturers or add additional manufacturers with corresponding prices, but only the manufacturers listed by the Owner as "Base Bid" will be considered in determining the low bid. Listing of alternate equipment is optional and will not result in submitting a non-responsible bid if none is entered.
 - C. The Owner may select the Base Bid equipment or items of equipment of any alternate manufacturer listed, at Owner's discretion.
 - D. After the Date of Agreement and prior to the selection of the major equipment items, the Contractor, if requested by the Engineer, shall provide information in sufficient detail to allow the Owner and the Engineer to determine whether or not the proposed alternate equipment is equivalent to that specified. The selection of any alternate equipment by the Owner does not relieve the Contractor of his/her responsibility to meet the requirements of the Contract Documents and Specifications.
 - E. Items of equipment selected by the Owner shall be installed at a contract price equal to the Base Bid lump sum adjusted by the add or deduct shown for the items selected by the Owner if

different from the Base Bid items. The Owner will select major equipment items within thirty (30) days after the date of the Notice to Proceed, provided Contractor has provided sufficient information to Owner/Engineer as noted above.

- F. *The Bidder understands that equipment of a proposed alternate manufacturer must meet or exceed the requirements of the Contract Documents and Specifications, be of equal or better quality, and be of equal function to the base bid equipment.*
- G. The price add/deduct for all items of equipment other than base bid items shall include the preparation and submission to the Owner of complete submittals, including detailed drawings showing all modifications, if any, necessary to accommodate such equipment.
- H. The price add/deduct for all items of equipment other than base bid items shall cover a complete operating installation, including any and all buildings, mechanical and electrical work, controls and accessories necessary to accommodate the selected equipment.
- I. The Bidder further understands that the Engineer will review said detailed Drawings or modifications and either approve them or indicate thereon changes necessary to comply with the project requirements in accordance with Article 6.05 of the General Conditions. Detailed drawings which are not approved will be revised and then resubmitted to the Engineer. The deduct and add amounts listed are "installed" prices and take into consideration and include any cost of the design or construction changes that may be required as a result of using the alternate equipment. Unless listed separately, the amount listed shall apply to the additive items also if they are awarded by the Owner.

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.
- 6.03 Bidder agrees to comply with Idaho Code 44-1001 through 44-1005, regarding employment of Idaho residents.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
 - A. Required Bid security in accordance with Article 8 of the Instructions to Bidders;
 - B. Evidence of Authority to Sign;
 - C. Bidder shall include in their Bid the name, or names and address, or addresses, and Idaho Public Works Contractor License Numbers of the Subcontractors who shall, in the event the Bidder secures the Contract, subcontract the plumbing, heating and air-conditioning work, and electrical work under the general Contract;

- D. Bidder's State of Idaho Public Works Contractor's License No. ; 14401-U-1-3-5
- E. Contractor's Non-Collusion Affidavit;
- F. Anti-Discrimination Affidavit;
- G. Required forms from IDEQ Idaho Drinking Water State Revolving Fund (DWSRF) Specifications Insert (Section 4).
1. FORM AIS-1 – Bidder's Certification of Compliance with the Current SRF Assistance American Iron and Steel (AIS) Provisions.

ARTICLE 8 – DEFINED TERMS

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

- 9.01 This Bid is submitted by: TML Construction, Inc.

If Bidder is:

An Individual N/A

Name (typed or printed): _____

By: _____
(Individual's signature)

Doing business as: _____

A Partnership N/A

Partnership Name: _____

By: _____
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): _____

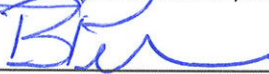
Date of Qualification to do business in Idaho is ____/____/____.

A Corporation

Corporation Name: TML Construction, Inc (SEAL)

State of Incorporation: Idaho

Type (General Business, Professional, Service, Limited Liability): _____

By: 
(Signature -- attach evidence of authority to sign) see attached

Name (typed or printed): Brian Petersen

Title: President
(CORPORATE SEAL)

Attest 

Date of Qualification to do business in Idaho is 7/13/99.

A Joint Venture

N/A

Name of Joint Venture: _____

First Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Date of Qualification to do business in Idaho is ____/____/____.

Second Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Date of Qualification to do business in Idaho is ____/____/____.

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address PO Box 2970

Hayden ID 83835

Phone No. 208 762-3611 Fax No. 208 762-9732

E-mail Brian@tmlconst.com

SUBMITTED on 9/13, 2022.

Idaho Public Works Contractor License No. 14401-U-1-3-5

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BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (Name and Address):

TML Construction, Inc.
10186 N. Atlas Road, Hayden, ID 83835

SURETY (Name and Address of Principal Place of Business):

Travelers Casualty and Surety Company of America
One Tower Square, Hartford, CT 06183

OWNER (Name and Address):

City of Moscow
206 East 3rd Street, Moscow, ID 83843

BID

Bid Due Date: September 13, 2022

Description (Project Name and Include Location): Booster Station Replacement - Phase II Rebid
#118-016, Moscow, Idaho

BOND

Bond Number: Bid Bond

Date (Not earlier than Bid due date): September 13, 2022

Penal sum	Five Percent of Amount Bid	\$	5%
	(Written in Words)		(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

TML Construction, Inc. (Seal)
Bidder's Name and Corporate Seal

By: 
Signature

Brian Petersen
Print Name

President
Title

Attest: 
Signature

VP
Title

SURETY

Travelers Casualty and Surety Company of America (Seal)
Surety's Name and Corporate Seal

By: 
Signature (Attach Power of Attorney)

Shelly Donovan
Print Name

Attorney-in-Fact
Title

Attest: 
Signature Shawn M. Wilson

Attorney In Fact
Title

Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

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Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company
Farmington Casualty Company

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, St. Paul Fire and Marine Insurance Company, and Farmington Casualty Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint Shelly Donovan of Spokane, WA, their true and lawful Attorney(s)-in-Fact to sign, execute, seal and acknowledge the following bond:

Surety Bond No.: Bid Bond
OR

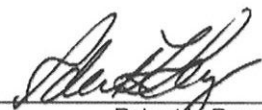
Principal: TML Construction, Inc.
Obligee: City of Moscow

Project Description: Booster Station Replacement - Phase II Rebid, #118-016 Moscow, Idaho

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this **21st** day of **April**, 2021.



State of Connecticut

By: 
 Robert L. Raney, Senior Vice President

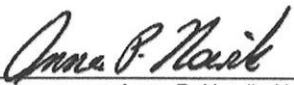
City of Hartford ss.

On this the **21st** day of **April**, 2021, before me personally appeared **Robert L. Raney**, who acknowledged himself to be the Senior Vice President of each of the Companies, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of said Companies by himself as a duly authorized officer.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

My Commission expires the **30th** day of **June**, 2026




 Anna P. Nowik, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of each of the Companies, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

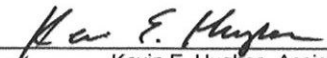
FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of each of the Companies, do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which remains in full force and effect.

Dated this 13th day of September, 2022.




 Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, please call us at 1-800-421-3880.

Please refer to the above-named Attorney(s)-in-Fact and the details of the bond to which this Power of Attorney is attached.

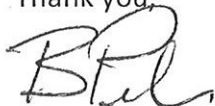
To whom it may concern,

The following persons are corporate officers and board members with authority to sign for all aspects of TML Construction, Inc.

Brian Petersen – President

Sydney Petersen – VP, Secretary/Treasurer

Thank you,



Brian Petersen

President

City of Moscow
Booster Station Replacement – Phase II Rebid

Naming of Subcontractors Form

Per Idaho Code, §67-2310, Bidder shall include in his or her Bid the names and address, and Idaho Public Works Contractor License Number of the Subcontractors who shall, in the event the Bidder secures the Contract, subcontract the plumbing, heating and air-conditioning work, and electrical work under the general Contract. Failure to name Subcontractors as required shall render any Bid submitted by the Bidder unresponsive and void.

<u>Subcontractor Name and Address</u>	<u>Classification</u>	<u>License Number</u>
HILLIARD'S HEATING & PLUMBING Inc PO 414 Pullman WA 99163	Plumbing	12545-A-4
Hilliard's Heating & Plumbing Inc PO 414 Pullman WA 99163	HVAC	12545-A-4
Stroom Electric Inc PO 370 Troy ID 83871	Electrical	022495-AA-4

NOTES TO USER

1. This form must be included for all bids.

Brad Little
Governor

State of Idaho
Division of Occupational and Professional Licenses
PUBLIC WORKS CONTRACTORS LICENSING
CONTRACTOR

PWC-C-14401 - UNLIMITED - 1- 3- 5
License Number

08/12/1999
Original License Issued

This is to certify that
TML CONSTRUCTION, INC.

has fulfilled the requirements of the law relating to licensing in Idaho Code, Title 54, Chapter 19 & 45
and is hereby granted this certificate.

This license expires: 05/31/2023

Sydney Peltz

Licensee Signature

Russell S. Barron

Russell Barron, Administrator

City of Moscow
Booster Station Replacement – Phase II Rebid

Contractor's Non-Collusion Affidavit

State of Idaho

) SS

County of Kootenai

Bid for City of Moscow, being first duly sworn, deposes, and says that he is VP [sole owner, a partner, president, secretary, etc.] of, TML Construction, Inc [Bidder],

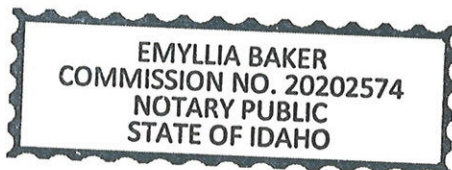
the party making the foregoing Bid; that such Bid is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization or corporation; that such Bid is genuine and not collusive or sham; that said Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham Bid and has not directly or indirectly colluded, conspired, connived or agreed with any Bidder or anyone else to put in a sham Bid, nor that anyone shall refrain from bidding; that said Bidder has not in any manner, directly or indirectly, sought by agreement, communication or conference with anyone to fix the Bid Price of said Bidder or of any other Bidder, nor to fix any overhead, profit or cost element of such Bid Price, nor of that of any other Bidder, nor to secure any advantage against the public body awarding the Contract or anyone interested in the proposed Contract; that all statements contained in such Bid are true; and, further, that said Bidder has not directly or indirectly submitted his Bid Price or any breakdown thereof, nor the contents thereof, nor divulged information or data relative thereto, nor paid and will not pay any fee in connection therewith to any corporation, partnership, company, association, organization, bid depository, nor to any member or agent thereof, nor to any other individual except to such person(s) as has/have a partnership or other financial interest with said Bidder in his general business.

Signed: Sydney Pelt

Title: VP

Subscribed and sworn to before me this 9th
day of September, 2022

(SEAL)



Notary Public Emylin Bahr
State of Idaho
My Commission Expires 7/13/2026

Document 00415 - 1

NON-COLLUSION AFFIDAVIT

City of Moscow
Booster Station Replacement – Phase II Rebid

Anti-Discrimination Affidavit

STATE OF Idaho

COUNTY OF Kootenai

The Bidder hereby covenants, stipulates, and agrees that no person shall be discriminated against in the bidding of the services and/or materials herein under and that the Bidder shall not refuse to hire any person therefore because of such person's race, creed, sex, color, or national origin, unless based on a bona fide occupational qualification. Also, the Bidder will in no manner discriminate against any person because of such person's race, creed, sex, color, or national origin. Any such discrimination shall be deemed a violation of this Bid and shall render this Bid subject to forfeiture.

Sweeney Pete

Contractor's Signature

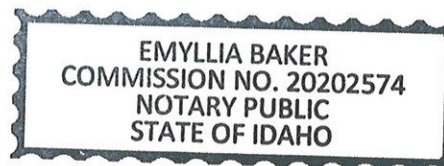
Subscribed and sworn to before me this 9th day of September, 2022

Emyllia Baker
Notary Public

State of Idaho

Residing at 1715 W KATHLEEN AVE CDA ID 83815

My Commission Expires 7/13/2026



To be submitted as part of the sealed bid; Recipient forwards a copy to DEQ

FORM AIS-1
Bidder's Certification of Compliance
With the Current SRF Assistance American Iron and Steel (AIS) Provisions

(To be submitted as part of the sealed bid)

Bidder's Statement of Certification

The Bidder acknowledges to and for the benefit of the ("Owner") for the ("Project") that the Bidder understands the project is being funded in part with SRF Assistance. "AIS" requirements specify that all iron and steel products used in the project shall be produced in the United States. Consistent with the terms of the Owner's bid solicitation and the provisions of SRF Assistance, the Bidder hereby represents and warrants to and for the benefit of the Owner that:

1. The Bidder has reviewed and understands the AIS requirements.
2. The Bidder certifies that the iron and steel goods used in the project will be produced in the United States in a manner that complies with the AIS requirements unless a waiver of the requirements is requested by the Owner and approved by the EPA.
3. The Bidder agrees to provide to the Owner reasonable, sufficient, and timely information, certification, or verification of the United States production of each component contained in Attachment 6 as a prior condition for approval of - and reimbursement for - materials received.
4. The undersigned hereby acknowledges that the iron and steel products utilized in this project will meet the current SRF Assistance AIS requirements, and that all required Manufacturer/Supplier Certification Statements or waivers from EPA will be obtained to document compliance with the AIS requirements.

Bidder Signature:  Date: 9/13/22

Title President

Organization TML Construction, Inc.

**City of Moscow
Booster Station Replacement - Phase II Rebid**

ADDENDUM No. 1

September 2, 2022

Addendum No. 1 to the **Booster Station Replacement - Phase II Rebid** Plans, Contract Documents, and Specifications as prepared by J-U-B ENGINEERS, Inc. is hereby submitted for use in bid preparation and submittal. The following changes, additions, and/or deletions are hereby made as fully and completely as if the same were entirely set forth in the Contract Documents and Specifications, and shall become an integral part of any contract entered into between the Owner and Contractor.

GENERAL

A pre-bid meeting was held on September 1, 2022. Conformed notes and the attendance sheet from the meeting are **attached** at the end of this addendum for reference (8 pages).

SPECIFICATIONS

TECHNICAL SPECIFICATIONS

Section 11103 – Vertical Multistage Pump

Delete paragraph 2.3.B.3 – Major components in its entirety and replace with the following:

3. The pumps impeller, diffuser, shaft, and outer sleeve shall be constructed of 316 stainless steel. The pump base shall be constructed of stainless steel or cast iron with factory epoxy coating.

Section 16928 – Control System

Add the following to paragraph 1.15.A – Approved Control System Integrators:

7. “Taurus Power & Controls, Inc.; Kent, WA; 425-656-4170”

PLANS

SHEET C-102 (INDIAN HILLS BOOSTER PUMP STATION)

Add the following General Note:

“3. SPOT ELEVATIONS SHOWN ALONG BUILDING FACES OR CORNERS ARE FOR ADJACENT GRADING ONLY. COORDINATE BUILDING CONTROL POINTS FOR BUILDING LAYOUTS WITH OWNER PROVIDED SURVEY.”

SHEET C-104 (PONDEROSA BOOSTER PUMP STATION)

Add the following General Note:

“2. SPOT ELEVATIONS SHOWN ALONG BUILDING FACES OR CORNERS ARE FOR ADJACENT GRADING ONLY. COORDINATE BUILDING CONTROL POINTS FOR BUILDING LAYOUTS WITH OWNER PROVIDED SURVEY.”

NOTICE is hereby given that Addendum must be acknowledged in the Article 3 of the Bid Form as evidence that the Bidder is familiar with all changes incorporated herein.

Submitted by:

J-U-B ENGINEERS, Inc.



Michelle L. Johnson, P.E.
Project Manager

PRE-BID MEETING **MINUTES** (REBID)

Subject: City of Moscow Booster Station Replacement – Phase II Rebid

Date and Time: September 1, 2022; 2:00 pm

Location: Moscow City Hall Council Chambers, 206 E. Third Street, Moscow, ID and

Zoom meeting

Attendees: See attached sign-in sheet

AGENDA

Meeting Purpose: Discuss the project scope and schedule, review the bid requirements and portions of the Bidding Documents, answer questions from Bidders related to the project, and conduct a site visit. Topics of discussion will highlight the Project but should not be taken out of context of the entire bid package.

Project Overview

Contract Document Review

Addenda

Bidder Questions

PROJECT OVERVIEW

- **Sign-In Sheet**
 - **Project Summary**
 - Moscow Booster Station Replacement – Phase II Rebid generally consists construction of two (2) new booster pump stations, Indian Hills and Ponderosa, including site work, piping, pumps and all appurtenances, electrical and controls. It is the intent of these documents to describe the work required to complete this project in sufficient detail to secure comparable bids. All parts or work not specifically mentioned that are necessary in order to provide a complete installation shall be included in the bid and shall conform to all local, State, and Federal requirements.
-

- **Project Funding**
 - City of Moscow
 - IDEQ Idaho Drinking Water State Revolving Fund Loan
 - Davis Bacon wages **do** apply.
 - American Iron and Steel provisions **do** apply.
- **Bid and Contract Document Overview**
 - Volume I
 - Section 1
 - Bid Forms
 - Contract Forms
 - Section 2 – General Conditions
 - Section 3 – Supplementary Conditions
 - Section 4 – Form 6A – IDEQ Drinking Water State Revolving Fund (DWSRF)
Specification Insert
 - **FORM AIS1 must be included with bid**
 - Section 5 – Prevailing Wage (Davis Bacon) Determination
 - **Will be re-issued in addenda if wage determination has been updated**
 - Section 6 – City of Moscow Federally Funded Projects Davis Bacon Labor
Standards
 - Volume II
 - Technical Specifications
 - City of Moscow Standard Construction Specifications and Standard
Construction Drawings
 - Geotechnical Evaluation
 - Volume III
 - Plans

CONTRACT DOCUMENTS

- **Notice of Advertisement:**

- Bids for the project are due by 2:00 p.m. September 13, 2022, at the office of the Community Planning & Design Engineering Division at 504 S. Washington Street, Moscow, ID.
- The bids will be publicly opened and read aloud that same day at 2:15 p.m at the same location.

- **Section 1A - Bid Forms**

- **Document 00040 - Bidder's Checklist:** This list is offered as an aid to the Bidder in preparing the bid. Verify all of the items listed are provided, as a minimum.
- **Document 00200 - Instructions to Bidders:**
 - Describes conditions related to the project, bid submittal, bid security, etc.
 - Issuing Office: J-U-B ENGINEERS in Moscow, ID; phone: (208) 746-9010. Questions should be directed to Braxton Klas (bklas@jub.com); copies of the documents are available from Quest CDN (www.questcdn.com), project # 8276908.
 - Article 11 - Substitutes and "or-equals" items
 - a. Will not be considered until after effective date of Agreement.
 - Article 23 – Retainage
 - a. Retainage will be 5%
- **Document 00410 – Bid Form**
 - Fill out all blank spaces in the bid form.

- Bid will remain subject to acceptance for 60 days (Article 2.01)
- Note Interpretations and Addenda (Article 3.01)
- Article 5 – Basis of Bid; Comparison of Bids
 - a. Lump Sum
- **Document 00415 – Contractor’s Non-Collusion Affidavit**
- **Document 00420 – Anti-Discrimination Affidavit**
- **Document 00430 – Bid Bond-Penal Sum Form**
- **Document 00440 – Naming of Subcontractors Form**
- **Section 1B - Contract Forms**
 - **Document 00510 - Notice of Award**
 - **Document 00520 - Agreement:**
 - City of Moscow standard agreement
 - Conditions of the Agreement, including scope of the Contract Documents.
 - Substantial Completion: 270 Calendar Days, with provisions for equipment delay contract shut down.
 - Final Payment: 30 Days post Substantial Completion
 - **Document 00550 - Notice to Proceed**
 - **Document 00610 - Performance Bond:** Required from the successful bidder for the project.
 - **Document 00615 - Payment Bond:** Required from the successful bidder for the project.
 - **Form WH-5 (EFO00168) – Public Works Contract Report**
 - **Application for Payment, Certificate of Substantial Completion, Change Order, Field Order, etc.:** Sample of forms to be used during construction.
- **Section 2 – General Conditions – ISPWC Division 100**

- **Section 3 – Supplementary Conditions**
 - Modifications to the General Conditions
 - Insurance requirements (Worker’s Compensation, General Liability, Automobile Liability, Contractual Liability, etc.)
- **Section 4 – Form 6A – IDEQ Idaho Drinking Water Revolving Fund (DWSRF) Insert**
 - Form AIS1 must be included with bid
- **Section 5 – Prevailing Wage (Davis Bacon) Determination**
- **Section 6 – City of Moscow Federally Funded Projects Davis Bacon Labor Standards**
 - Wage interviews will be conducted by either City or J-U-B
- **Technical Specifications**
 - Division 1 General Requirements
 - Division 2 Earthworks
 - 02677 – Disinfection and Iron Bacteria Prevention
 - Division 15 Mechanical
 - Drinking Water System, all pipe, fittings, and equipment shall be NSF 61 compliant.
 - 11103 – Vertical Multistage Pump (Duty Pumps)
 - 11111 – Horizontal End Suction (Fire Pumps)
 - Division 16 Electrical
 - 16927 – Blue Logix, the programmer, shall be retained by the CSI.
 - 16928 – Control System Integrators
 - Appendix A – City of Moscow Standard Specifications and Contract Drawings
 - Appendix B – Geotechnical Engineering Evaluation
- **Plans**
 - G-001 to G-005 – General Sheets
 - C-101 to C-104 – Site Civil

- L1-001 to LP-101 – Landscaping (Ponderosa Only)
- S-100 to S-921 – Structural
- A-001 to A-905 – Architectural
- D1-101 to D2-301 – Process Mechanical
- CD-501 to CD-508 – Standard Details
- E-001 to E-950 - Electrical

ADDENDA

- Addendum 1 –
 - Addendum No.1 will be released this week or early next week.

BIDDER QUESTIONS

1. Can the bid be delayed by one week?
 - a. No, the bid cannot be delayed since it could delay the City Council review by a month.
2. Will a price escalation clause be included?
 - a. No escalation clause will be included.
3. Is the building permit the Contractor's responsibility?
 - a. No, per section 01010-1.7, Owner will secure permit and pay any associated costs.
Contractor shall coordinate with City Building Department for inspections.
4. Are testing and special inspections the Contractor's responsibility?
 - a. Yes, per section 01400-1.6.A Contractor shall retain services of an independent firm to perform Special Inspections and testing.
5. Were the plans and specs updated?
 - a. The plans and specs were updated between the original bid in March and the current bid announcement, but none have been made since the advertisement of the Rebi.
6. Is all excavated soil supposed to be hauled off site, or can some of it be used for grading?
 - a. Contractor to reference contract documents for material requirements.



J-U-B ENGINEERS, INC.

Pre-Bid Meeting Zoom Attendance (REBID)

PROJECT NAME: Booster Station Replacement – Phase II Project

OWNER: City of Moscow

DATE/ TIME: September 1, 2022 at 2:00pm

LOCATION: Moscow City Hall Council Chambers, 206 E. Third Street, Moscow, ID and Zoom meeting

Name	Organization	Email	Phone
Jessica Waller	J-U-B Engineers, Inc.	jwaller@jub.com	208-762-8787
Matt Barker	AEI Engineering	matt.barker@aei-engineering.com	208-666-4001
Ray Watkins	AEI Engineering	ray.watkins@aei-engineering.com	208-666-4001
Jennifer Jessop	J7 Contracting	admin@j7contracting.com	208-267-6000
Russ Ekins	PDI	russ@pdicontrols.com	
Jeramie Jenkins	Knife River	Jeramie.jenkins@kniferiver.com	
Jonathan Bergford	IMCO Construction	jbergford@imcoconstruction.com	360-410-9890
Brian Peterson	TML Construction	brian@tmlconst.com	208-755-4810
Braxton Klas	J-U-B Engineers, Inc.	bklas@jub.com	208-746-9010
Scott Bontrager	City of Moscow	sbontrager@ci.moscow.id.us	208-883-7030
Andrew Kovisto	City of Moscow	akovisto@ci.moscow.id.us	
David Watkins	J-U-B Engineers, Inc.	dwatkins@jub.com	208-746-9010

COMMITTEE STAFF REPORT

DATE: Monday, September 26, 2022



RESPONSIBLE STAFF

Alisa Anderson, Grants Manager, Eric Warner

ADDITIONAL PRESENTER(S)

OTHER RESOURCES

N/A

AGENDA ITEM TITLE

Police STEP Grant Award Acceptance (ACTION ITEM) - Alisa Anderson / Eric Warner

DESCRIPTION

In 2021, the Moscow Police Department (MPD) was awarded a grant for the Selective Traffic Enforcement Program (STEP). The Idaho Transportation Department (ITD), Office of Highway Safety (OHS) sponsors this program for Idaho to address specific behaviors related to traffic safety priority areas and safety deficiencies within local law enforcement jurisdictions. The STEP grants are focused on combatting traffic crashes resulting in fatal and serious injuries and the grant funding reimburses law enforcement departments for time dedicated to traffic enforcement by tracking problem identification to include objectives, performance measures and targets, and expenses. The MPD has received notification of award for a second year of funding of \$100,000 to include \$88,000 for regular-time traffic officer enforcement plus \$12,000 for overtime to include allowable benefit percentages. The program allows one officer or a combination of officers to work the regular dedicated hours and overtime. The MPD employs a dedicated traffic enforcement officer; however, the Department has formed a "Traffic Enforcement Team" to fulfill the grant requirements. The match requirement is 25% of the total amount requested and can include salaries of individuals working on the project, mileage, training provided, and office supplies. This program does not overlap with the High Visibility Enforcement Mobilization grants, which reimburse for overtime only during specific time periods but does require participation in the FFY2023 scheduled events. The new grant award period is October 1, 2022 through September 30, 2023, which matches the City's FY2023 budget cycle. Attached to this report is the Award Letter, Grant Agreement to Include Schedule A outlining the award requirements, Attachment 1 Certifications and Assurances, and Attachment 2 Subrecipient Financial Risk Assessment for FY23.

STAFF RECOMMENDATION

Recommend approval for the Moscow Police Department to accept the STEP grant award for \$100,000 for the FY2023 budget period.

PROPOSED ACTIONS

PROPOSED ACTIONS: Recommend approval for the Moscow Police Department to accept the STEP grant award in an amount not to exceed \$100,000 for the FY2023 budget period or provide staff with further direction.

FISCAL IMPACT

The match requirement is 25% of the total amount awarded and can include in-kind salaries of individuals working on the project, mileage, training provided, and office supplies.

PERSONNEL IMPACT

Police, Grants and Finance Departments

ATTACHMENTS

1. FFY 2023 Grant Award Letter
2. SPT2023 Moscow STEP Grant Agreement



**Your Safety • Your Mobility
Your Economic Opportunity**

IDAHO TRANSPORTATION DEPARTMENT

P.O. Box 7129 • Boise, ID 83707-1129
(208) 334-8000 • itd.idaho.gov

Captain Roger Lanier
Moscow Police Department
155 Southview Ave.
Moscow, ID 83843

September 13, 2022

RE: OHS Highway Safety Grant FFY 2023

Dear Captain Lanier,

In February 2022 the Office of Highway Safety (OHS) received your grant application for a Federal Fiscal Year (FFY) 2023 highway safety grant. The application has been reviewed and was recommended for approval by the Idaho Traffic Safety Commission (ITSC). The grant was included in the Highway Safety Plan and approved by the Idaho Transportation Board June 2022.

This agreement is funded under the NHTSA (National Highway Traffic Safety Administration) Federal grant program. Funding of this agreement is dependent upon the availability of federal funds as appropriated and obligated by the US Department of Transportation for FFY 2023.

The Federal Fiscal Year 2023 (FFY23) is October 1, 2022 through September 30, 2023. You will receive a formal grant agreement for your signature along with the associated documents. Once the documents are fully executed, and a pre-grant conference has been held, you will receive a notice to proceed at which time funds from the awarded grant may be expended.

The Office of Highway Safety appreciates your request and all that the Moscow Police Department does to keep Idaho's roads safe.

Sincerely,

Grants Contracts Officer
Lisa Losness

Cc: Alisa Anderson

Program Name: Moscow PD STEP Grant

State Program: SPT2303

Funding: \$100,000

Match: \$25,000

CFDA (Catalog Federal Domestic Assistance): 20.600

FAIN (Federal Award Identification Number): 69A37523300004020IDO

HIGHWAY SAFETY GRANT

Idaho Transportation Department Office of Highway Safety



ITD-667 07/20 Ex

OFFICE OF HIGHWAY SAFETY PO Box 7129 Boise, ID 83707-1129 Phone: (208) 334-8100 Fax: (208) 334-4430			FOR OHS USE ONLY																							
			Grant Project Name: Moscow PD STEP Grant																							
			Grant Project Number/s: SPT2303 \$100,000 _____ _____ _____ _____ _____ _____ _____ _____ _____																							
1. AGENCY Moscow Police Department Address 155 Southview Ave. Moscow, ID 83843			Effective Date: From _____ To _____ FAIN: 69A375233000040201D0 CFDA: 20.600 EIN: 826000227																							
2. GRANT MANAGER Alisa Anderson Title _____ Address 504 South Washington St. PO Box 9203 Moscow ID 83843 Phone 208-883-7600 E-mail Address aanderson@ci.moscow.id.us			GRANT REVISION SUMMARY																							
			<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 33%; text-align: center;">Date</th> <th style="width: 33%; text-align: center;">Type*</th> <th style="width: 33%; text-align: center;">By</th> </tr> <tr><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td><td>_____</td></tr> </table>			Date	Type*	By	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
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3. GOVERNMENT UNIT/AUTHORIZING OFFICIAL Name Roger Lanier Title Captain Address 115 Southview Ave. Moscow, ID 83843 Phone 208-883-7054 E-mail Address _____			*Type: BCC = Budget Category Change IFF = Increase In Federal Funds PPC = Participation Percentage Change AC = Activity Change GMC = Grant Manager Change DFF = Decrease In Federal Funds																							
4. GRANT INFORMATION <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 20%;">Funding Source</th> <th style="width: 15%;">Percentage</th> <th style="width: 15%;">Amount</th> <th style="width: 20%;">Local Benefit</th> <th style="width: 30%;">Amount</th> </tr> <tr> <td>Local (match)</td> <td>25%</td> <td>\$ 25,000.00</td> <td>100%</td> <td>\$ 100,000.00</td> </tr> <tr> <td>Federal</td> <td>75%</td> <td>\$ 100,000.00</td> <td>N/A</td> <td></td> </tr> </table>						Funding Source	Percentage	Amount	Local Benefit	Amount	Local (match)	25%	\$ 25,000.00	100%	\$ 100,000.00	Federal	75%	\$ 100,000.00	N/A							
Funding Source	Percentage	Amount	Local Benefit	Amount																						
Local (match)	25%	\$ 25,000.00	100%	\$ 100,000.00																						
Federal	75%	\$ 100,000.00	N/A																							
5. ACCEPTANCE OF CONDITIONS: It is understood and agreed by the below-signed that a grant received as a result of this application is subject to Public Law 89-564 as amended (Highway Safety Act of 1996) and Idaho statutes and all administrative regulations governing grants established by the U.S. Department of Transportation and the State of Idaho. It is agreed that this grant constitutes an official part of the state's Highway Safety Program and that said applicant agency will meet the requirements as set forth herein, including accompanying Schedules A and B which are incorporated herein and made a part of this contract. It is further agreed that applicant agency will be bound to those requirements set forth in the Highway Safety Grant Procedure Manual, published by the Idaho Office of Highway Safety. These requirements include Equal Opportunity assurance, provisions of the Hatch Act, OHS provisions for equipment purchase and maintenance, propriety of copyrights, and inventions and patents. The Office of Highway Safety make no representation or guarantee regarding the availability of federal highway safety funds, and reimbursement of applicant agency costs is subject to such availability.																										
6. AUTHORIZING SIGNATURES _____ Grant Manager _____ Date _____ Authorizing Official _____ Date																										
Josephine Middleton, Highway Safety Manager Office of Highway Safety			_____ Date Approved																							

OFFICE OF HIGHWAY SAFETY**Moscow Police Department – Strategic Traffic Enforcement Program (STEP) Grant**

NHTSA Federal Project ID: PT-2023-03-00-00

State Program Number: SPT2303

PROBLEM STATEMENT

The Idaho Transportation Department, Office of Highway Safety (OHS) is committed to the elimination of deaths and serious injuries on Idaho's roads. To make progress toward the goal of "Toward Zero Deaths" OHS will provide federal funding to state, county and local law enforcement agencies and use funds directly based on the following identified highway safety problems.

Program Area: Police Traffic Services

Countermeasure strategy: High Visibility Enforcement

The city of Moscow is a hub for traffic from Eastern Washington and northern Idaho. There are two major universities, which bring a diverse population of inexperienced young drivers, cyclists and pedestrians, thus creating an increase in traffic-related calls. In addition, there are many popular events throughout the year in the local area including National Night Out.

Target: To reduce the number of injuries and fatalities to create safer roadways and promote safety awareness, increasing citizen contacts in Moscow.

2020 Population (in 1,000's)	Number of Crashes			Number of Persons		Fatal and Injury Crash Rate per 1,000 population
	Total	Fatal	Injury	Killed	Injured	
25.9	239	1	51	1	65	2.0

(Source: 2021 Idaho Traffic Crash Data)

OBJECTIVE

Reduce traffic crash deaths and serious injuries in Moscow by increasing law enforcement presence and implementing high visibility enforcement traffic patrols to reduce impaired, aggressive and distracted driving crashes and increase the use of occupant protection.

GRANT TASKS AND DELIVERABLES

- A. The Moscow Police Department during regular duty STEP hours, will conduct impaired driving, aggressive driving, occupant protection, and distracted driving integrated high visibility enforcement patrols.
- B. Crash data in conjunction with historical records of large community events, concerts, holidays, etc. may be used to determine locations where increased enforcement is likely

needed to make the greatest difference and where grant-funded patrols would be the most effective to reduce impaired, aggressive, and distracted driving.

C. Participate in the FFY23 High Visibility Enforcement Mobilizations.

A. FFY 2023 HVE Mobilization Schedule	B. Column1
Seat Belts - Nov Thanksgiving	Nov. 18-30-2022
Impaired Driving - Holidays	Dec. 14, 2022 - Jan 1, 2023
Impaired Driving - Super Bowl	Feb. 10 - 13, 2023
Aggressive Driving - Spring	Feb. 26 - Mar. 11, 2023
Impaired Driving - St. Patrick's Day	Mar. 16 - 19, 2023
Distracted Driving - April	Apr. 5 - 19, 2023
Seat Belts - May	May 15 - June 2, 2023
Impaired Driving - 4th of July	June 30 - July 9, 2023
Aggressive Driving - Summer	July 14 - 30, 2023
Impaired Driving - Labor Day	Aug. 18 - Sept. 4, 2023

1. Take a zero-tolerance enforcement stance toward seat belt violations and cite those not wearing seat belts during the term of the grant.
2. Dedicate specific hours of enforcement for educational outreach activities using stops as an opportunity to educate the public about occupant protection whether or not the occupants are wearing restraints.

D. Distribute educational material as appropriate.

1. Participate in public education and information outreach efforts to create a general deterrence toward crash-causing behavior.
2. Obtain traffic safety promotional materials from OHS and distribute the materials during traffic stops and other appropriate times.
3. Encourage youthful drivers to participate in the Alive at 25 defensive driving courses. Conduct presentations and safe driving public speaking engagements in the community.

E. Submit claims, quarterly reports and a final performance report to OHS as provided by the terms outlined in the OHS Highway Safety Grant Procedure Manual to the Grant/Contracts Officer.

1. Reimbursement claims may be submitted monthly but **no less** than quarterly using form ITD-669 OHS Reimbursement Claim (Attachment 3). OHS reserves the right to request timesheet and payroll documents for patrol officers and documentation must easily verify the officers' hours on each claim.
 2. Traffic Patrol conducted during grant funding is to be submitted on the Performance Reports and submitted monthly or with the quarterly reports (Attachment 6). Use the report to compile and submit the total number of reportable crashes, traffic contacts and citations issued during grant activity time.
 3. This grant requires a 25% agency match.
- F. Examples of match include mileage incurred during enforcement activities, salary for personnel conducting outreach related to the grant activities, percentage of salary of officers working the grant, patrol hours by officers not on grant time. Record the match on the grant reimbursement claim. (Attachment 3)

The federal fiscal year ends on September 30, 2023. Grantee must ensure that all funded activities are completed by the end of the federal fiscal year.

Submit the FINAL Report no later than October 15th following the end of the federal fiscal year. All claims and reports must be submitted before final reimbursement will be made to the grantee.

OTHER GRANT REQUIREMENTS

1. Grantee agrees to the CERTIFICATIONS AND ASSURANCES (Attachment 1) and will comply with the certification and assurances, as applicable. **PAGE 10 MUST BE SIGNED AND SUBMITTED** with the other Highway Safety Grant documents.
2. System for Award Management (SAM) is required when receiving federal awards or federal funds. This may be accessed at <http://www.sam.gov>.
 - A. The Grantee agrees it shall maintain current registrations in the System for Award Management (SAM) at all times during which it has active federal awards.
 - B. If OHS discovers the Grantee, or its principals or affiliates, is disbarred, suspended, or ineligible from federal contracting, grant may be terminated immediately.
- 1) Code of Conduct: No employee, officer, or agent of the Grantee shall participate in the selection, award or administration of a contract supported by grant funds if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when any of the following have a financial or other interest in the firm selected for award:

- a) The employee, officer or agent.
- b) Any member of his or her immediate family.
- c) His or her partner.
- d) An organization which employs, or is about to employ any of the above-listed.

The grantee's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from grantees, potential grantees, or parties to sub-Agreements.

The grantee guarantees it has not entered into any form of collusion with anyone, involving any form of payment, dependent upon or resulting from the award of this grant, contract or subcontract(s).

- 2) Conferences, Inspection of Work, Grant Monitoring: Conferences may be held at the request of either party to this Agreement. A representative of OHS and/or the U.S. Department of Transportation can visit the site for the purpose of inspection and/or assessment of work being performed at any time.
- 3) Travel: Grant related local vicinity travel, travel to other parts of the state, and travel outside the state must conform to state policies and procedures. Allowable reimbursements cannot be greater than those authorized for state employees, and reimbursements will be made to the Grantee for grant project travel. State policy requires economical and practical modes of travel, as well as moderate dining and lodging.
- 4) Tax and Compensation Liability: OHS will not incur any liability for worker compensation, FICA, withholding tax, unemployment compensation, or any other payment, which is not a part of the grant Agreement.
- 5) Responsibility for Claims and Liability: ITD, OHS, NHTSA, FHWA and the U.S. Department of Transportation shall be responsible only for the acts, omissions or negligence of such agency's own employees. The term "employee" is defined for the purposes of this section as set forth in Idaho Code section 6-902. Nothing in this Agreement shall extend the tort responsibility or liability of either ITD or ISP beyond that required by the Idaho Tort Claims Act, Idaho Code section 6-901 et seq. Each party shall be responsible for damage to property of the other party caused by its employees in the performance of the Agreement to the extent funds are legally available therefore.
- 6) Failure to comply with any of the terms of this Agreement, which includes the Grant Procedure Manual, may jeopardize grantee in receiving future funding from OHS.

ADMINISTRATIVE EVALUATION

Evaluation activities will be conducted on a routine basis to ensure that grant objectives are being met. The following information will be provided as part of the OHS Quarterly report and close out evaluation:

1. Provide the number of grant-funded overtime saturation patrols conducted and statewide saturation patrols (mobilizations) in which the Grantee participated. Other than the pre-scheduled traffic enforcement mobilizations periods set by OHS, when and where did the Grantee conduct the traffic enforcement saturation patrols?
2. Did the Grantee take a zero tolerance for unrestrained vehicle occupants (including children)?
3. Did the Grantee conduct public education and awareness activities? Please describe.
4. Were claims and reports submitted as instructed and in a timely manner?

IMPACT EVALUATION

Numetric, and/or the Grantee's agency data, the Grantee will assess the change in incidence of impaired driving, aggressive driving, distracted driving, and increased occupant protection use in fatal and serious injury crashes during the grant period.

1. Did the agency succeed in reducing the number of fatal and injury crashes?
2. Did the agency succeed in increasing public awareness regarding traffic safety? If yes, what methods were used to increase awareness?

Please complete the following information:

AUDIT

Company that conducts the yearly audit of the Moscow Police Department:

Name:

Address:

Phone:

MOSCOW POLICE DEPARTMENT FINANCIAL CONTACT

Financial claims will be processed by:

Contact Name:

Contact Phone:

Email:

EEO/HUMAN RESOURCES LIAISON

Contact Name & Contact Title:

Contact Phone:

Email:

ITD OFFICE OF HIGHWAY SAFETY CONTACT

Agency Representatives: Josephine Middleton, Highway Safety Manager
208-334-8112

Josephine.middleton@itd.idaho.gov

Lisa Losness, Grant Contracts Officer
(208) 334-8103

Lisa.losness@itd.idaho.gov

Physical Address: 3311 W. State Street, Boise, Idaho 83703

Mailing Address: P.O. Box 7129, Boise, Idaho 83707-1129

ITD FINANCIAL CONTACT

Gary Genova

Financial Services

Idaho Transportation Department

Phone (208) 334-8532

Email: gary.genova@itd.idaho.gov

FUNDING SOURCE

Fiscal Year	Funding Source CFDA	Funding Amount	Match Amount
FFY 2023	20.600	\$100,000.00	\$25,000.00

AUDIT- This project will be audited by the State Legislative Audit Program on a biennial basis. This audit process is the customary mechanism employed by the state of Idaho in accordance with Idaho Code 67-449, which is consistent with OMB Circular A-128.

ITEMIZATION OF BUDGET
Idaho Transportation Department Office of Highway Safety



ITD-667B 07-20 (Schedule B)

Project Title: State Impaired Driving Coordinator-ISP

		BUDGET	
		State/Local	Federal
PERSONNEL COSTS (HS H901)			
	Regular Duty Officer Hours	\$ 20,500.00	\$ 88,000.00
	Overtime Officer Hours	\$ 3,000.00	\$ 12,000.00
	Admin hours and non-grant funded officer hours	\$ 1,500.00	
		\$ 25,000.00	\$ 100,000.00
TRAVEL (HS H902)			
	Subtotal Travel	\$ -	\$ -
CONTRACTUAL SERVICES (HS H903)			
	Subtotal Contractual Services	\$ -	\$ -
CONSUMABLES (HS H904)			
	Subtotal Commodities	\$ -	\$ -
DIRECT COSTS (HS H905)			
	Subtotal Other Direct Costs	\$ -	\$ -
INDIRECT COSTS (HS H906)			
	0		
	Subtotal Indirect Costs	\$ -	\$ -
	TOTAL	\$ 25,000.00	\$ 100,000.00

Federal Share not to exceed: \$ 100,000.00

Revision #: _____

Project Title: Moscow PD - STEP Grant

Date: _____

Program No.: SPT2303

(list all) _____

Certifications and Assurances

for Fiscal Year 2023 Highway Safety Grants

(23 U.S.C. Chapter 4; Sec. 1906, Pub. L. 109-59, As Amended By Sec. 4011, Pub. L. 114-94)

Agency: _____

Fiscal Year: 2023

By submitting an application for Federal grant funds under 23 U.S.C. Chapter 4 or Section 1906, the Agency/Contractor acknowledges and agrees to the following conditions and requirements. In my capacity as the Agency's Representative, I hereby provide the following Certification and Assurances: GENERAL REQUIREMENTS the Agency will comply with applicable statutes and regulations, including but not limited to:

GENERAL REQUIREMENTS

- 23 U.S.C. Chapter 4 – Highway Safety Act of 1966, as amended
- Sec. 1906, Pub. L. 109-59, as amended by Sec. 4011, Pub. L. 114-94
- 23 CFR part 1300 – Uniform Procedures for State Highway Safety Grant Programs
- 2 CFR part 200 – Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards
- 2 CFR part 1201 – Department of Transportation, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards

FEDERAL FUNDING ACCOUNTABILITY AND TRANSPARENCY ACT (FFATA)

The Agency will comply with FFATA guidance, OMB Guidance on FFATA Subaward and Executive Compensation Reporting, August 27, 2010, ([https://www.fsrs.gov/documents/OMB Guidance on FFATA Subaward and Executive Compensation Reporting_08272010.pdf](https://www.fsrs.gov/documents/OMB_Guidance_on_FFATA_Subaward_and_Executive_Compensation_Reporting_08272010.pdf)) by reporting to FSRS.gov for each sub-grant awarded.

NONDISCRIMINATION

The agency will comply with all Federal statutes and implementing regulations relating to nondiscrimination ("Federal Nondiscrimination Authorities"). These include but are not limited to:

- **Title VI of the Civil Rights Act of 1964** (42 U.S.C. 2000d *et seq.*, 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin) and 49 CFR part 21;
- **The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970**, (42 U.S.C. 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- **Federal-Aid Highway Act of 1973**, (23 U.S.C. 324 *et seq.*), and **Title IX of the Education Amendments of 1972**, as amended (20 U.S.C. 1681-1683 and 1685-1686) (prohibit discrimination on the basis of sex);

- **Section 504 of the Rehabilitation Act of 1973**, (29 U.S.C. 794 *et seq.*), as amended, (prohibits discrimination on the basis of disability) and 49 CFR part 27;
- **The Age Discrimination Act of 1975**, as amended, (42 U.S.C. 6101 *et seq.*), (prohibits discrimination on the basis of age);
- **The Civil Rights Restoration Act of 1987**, (Pub. L. 100-209), (broadens scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal aid recipients, subrecipients and contractors, whether such programs or activities are Federally-funded or not);
- **Titles II and III of the Americans with Disabilities Act** (42 U.S.C. 12131-12189) (prohibits discrimination on the basis of disability in the operation of public entities,
public and private transportation systems, places of public accommodation, and certain testing) and 49 CFR parts 37 and 38;
- **Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations** (prevents discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations); and
- **Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency** (guards against Title VI national origin discrimination/discrimination because of limited English proficiency (LEP) by ensuring that funding recipients take reasonable steps to ensure that LEP persons have meaningful access to programs (70 FR 74087-74100)).

THE DRUG-FREE WORKPLACE ACT OF 1988 (41 U.S.C. 8103)

The State will provide a drug-free workplace by:

- a. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
- b. Establishing a drug-free awareness program to inform employees about:
 1. The dangers of drug abuse in the workplace;
 2. The grantee's policy of maintaining a drug-free workplace;
 3. Any available drug counseling, rehabilitation, and employee assistance programs;
 4. The penalties that may be imposed upon employees for drug violations occurring in the workplace;
 5. Making it a requirement that each employee engaged in the performance of the grant be given a copy of the statement required by paragraph (a);
- c. Notifying the employee in the statement required by paragraph (a) that, as a condition

of employment under the grant, the employee will –

1. Abide by the terms of the statement;
 2. Notify the employer of any criminal drug statute conviction for a violation occurring in the workplace no later than five days after such conviction;
- d. Notifying the agency within ten days after receiving notice under subparagraph (c)(2) from an employee or otherwise receiving actual notice of such conviction;
- e. Taking one of the following actions, within 30 days of receiving notice under subparagraph (c)(2), with respect to any employee who is so convicted –
1. Taking appropriate personnel action against such an employee, up to and including termination;
 2. Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;
- f. Making a good faith effort to continue to maintain a drug-free workplace through implementation of all of the paragraphs above.

POLITICAL ACTIVITY (HATCHACT)

The Agency will comply with provisions of the Hatch Act (5 U.S.C. 1501-1508), which limits the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

CERTIFICATION REGARDING FEDERAL LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement;
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions;

3. The undersigned shall require that the language of this certification be included in the award documents for all sub-award at all tiers (including subcontracts, subgrants, and contracts under grant, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.
4. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

RESTRICTION ON STATE LOBBYING

None of the funds under this program will be used for any activity specifically designed to urge or influence a State or local legislator to favor or oppose the adoption of any specific legislative proposal pending before any State or local legislative body. Such activities include both direct and indirect (e.g., "grassroots") lobbying activities, with one exception. This does not preclude a State official whose salary is supported with NHTSA funds from engaging in direct communications with State or local legislative officials, in accordance with customary State practice, even if such communications urge legislative officials to favor or oppose the adoption of a specific pending legislative proposal.

CERTIFICATION REGARDING DEBARMENT AND SUSPENSION

Instructions for Primary Tier Participant Certification (States)

- 1. By signing and submitting this proposal, the prospective primary tier participant is providing the certification set out below and agrees to comply with the requirements of 2 CFR parts 180 and 1200.*
- 2. The inability of a person to provide the certification required below will not necessarily result in denial of participation in this covered transaction. The prospective primary tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective primary tier participant to furnish a certification or an explanation shall disqualify such person from participation in this transaction.*
- 3. The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default or may pursue suspension or debarment.*

4. *The prospective primary tier participant shall provide immediate written notice to the department or agency to which this proposal is submitted if at any time the prospective primary tier participant learns its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.*
5. *The terms covered transaction, civil judgment, debarment, suspension, ineligible, participant, person, principal, and voluntarily excluded, as used in this clause, are defined in 2 CFR parts 180 and 1200. You may contact the department or agency to which this proposal is being submitted for assistance in obtaining a copy of those regulations.*
6. *The prospective primary tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is proposed for debarment under 48 CFR part 9, subpart 9.4, debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.*
7. *The prospective primary tier participant further agrees by submitting this proposal that it will include the clause titled "Instructions for Lower Tier Participant Certification" including the "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion—Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions and will require lower tier participants to comply with 2 CFR parts 180 and 1200.*
8. *A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not proposed for debarment under 48 CFR part 9, subpart 9.4, debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any prospective lower tier participants, each participant may, but is not required to, check the System for Award Management Exclusions website (<https://www.sam.gov/>).*
9. *Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.*
10. *Except for transactions authorized under paragraph 6 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is proposed for debarment under 48 CFR part 9, subpart 9.4, suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal government, the department or agency may terminate the transaction for cause or default.*

Certification Regarding Debarment, Suspension, and Other Responsibility Matters-Primary Tier Covered Transactions

- (1) The prospective primary tier participant certifies to the best of its knowledge and belief, that it and its principals:
- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;
 - (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or Local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
 - (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.
- (2) Where the prospective primary tier participant is unable to certify to any of the Statements in this certification, such prospective participant shall attach an explanation to this proposal.

Instructions for Lower Tier Participant Certification

1. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below and agrees to comply with the requirements of 2 CFR parts 180 and 1200.
2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal government, the department or agency with which this transaction originated may pursue available remedies, including suspension or debarment.
3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
4. The terms *covered transaction*, *civil judgment*, *debarment*, *suspension*, *ineligible*, *participant*, *person*, *principal*, and *voluntarily excluded*, as used in this clause, are defined in 2 CFR parts 180 and 1200. You may contact the person to whom this proposal is submitted for assistance in obtaining a copy of those regulations.

5. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is proposed for debarment under 48 CFR part 9, subpart 9.4, debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

6. The prospective lower tier participant further agrees by submitting this proposal that it will include the clause titled "Instructions for Lower Tier Participant Certification" including the "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions and will require lower tier participants to comply with 2 CFR parts 180 and 1200.

7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not proposed for debarment under 48 CFR part 9, subpart 9.4, debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any prospective lower tier participants, each participant may, but is not required to, check the System for Award Management Exclusions website (<https://www.sam.gov/>).

8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is proposed for debarment under 48 CFR part 9, subpart 9.4, suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal government, the department or agency with which this transaction originated may pursue available remedies, including suspension or debarment.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion -- Lower Tier Covered Transactions:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

BUY AMERICA ACT

The State and each subrecipient will comply with the Buy America requirement (23 U.S.C. 313) when purchasing items using Federal funds. Buy America requires a State, or subrecipient, to purchase with Federal funds only steel, iron and manufactured products produced in the United States, unless the Secretary of Transportation determines that such domestically produced items would be inconsistent with the public interest, that such materials are not reasonably available and of a satisfactory quality, or that inclusion of domestic materials will increase the cost of the overall project contract by more than 25 percent. In order to use Federal funds to purchase foreign produced items, the State must submit a waiver request that provides an adequate basis and justification for approval by the Secretary of Transportation.

PROHIBITION ON USING GRANT FUNDS TO CHECK FOR HELMET USAGE

The State and each subrecipient will not use 23 U.S.C. Chapter 4 grant funds for programs to check helmet usage or to create checkpoints that specifically target motorcyclists.

POLICY ON SEAT BELT USE

In accordance with Executive Order 13043, Increasing Seat Belt Use in the United States, dated April 16, 1997, the Grantee is encouraged to adopt and enforce on-the-job seat belt use policies and programs for its employees when operating company-owned, rented, or personally-owned vehicles. The National Highway Traffic Safety Administration (NHTSA) is responsible for providing leadership and guidance in support of this Presidential initiative. For information and resources on traffic safety programs and policies for employers, please contact the Network of Employers for Traffic Safety (NETS), a public-private partnership dedicated to improving the traffic safety practices of employers and employees. You can download information on seat belt programs, costs of motor vehicle crashes to employers, and other traffic safety initiatives at www.trafficsafety.org. The NHTSA website (www.nhtsa.gov) also provides information on statistics, campaigns, and program evaluations and references.

POLICY ON BANNING TEXT MESSAGING WHILE DRIVING

In accordance with Executive Order 13513, Federal Leadership On Reducing Text Messaging While Driving, and DOT Order 3902.10, Text Messaging While Driving, States are encouraged to adopt and enforce workplace safety policies to decrease crashes caused by distracted driving, including policies to ban text messaging while driving company-owned or rented vehicles, Government-owned, leased or rented vehicles, or privately-owned vehicles when on official Government business or when performing any work on or behalf of the Government. States are also encouraged to conduct workplace safety initiatives in a manner commensurate with the size of the business, such as establishment of new rules and programs or re-evaluation of existing programs to prohibit text messaging while driving, and education, awareness, and other outreach to employees about the safety risks associated with texting while driving.

SECTION 402 REQUIREMENTS

1. To the best of my personal knowledge, the information submitted in the Highway Safety Plan in support of the State's application for a grant under 23 U.S.C. 402 is accurate and complete.
2. The Governor is the responsible official for the administration of the State highway safety program, by appointing a Governor's Representative for Highway Safety who shall be responsible for a State highway safety agency that has adequate powers and is suitably equipped and organized (as evidenced by appropriate oversight procedures governing such areas as procurement, financial administration, and the use, management, and disposition of equipment) to carry out the program. (23 U.S.C. 402(b)(1)(A))
3. The political subdivisions of this State are authorized, as part of the State highway safety program, to carry out within their jurisdictions local highway safety programs which have been approved by the Governor and are in accordance with the uniform guidelines promulgated by the Secretary of Transportation. (23 U.S.C. 402(b)(1)(B))
4. At least 40 percent of all Federal funds apportioned to this State under 23 U.S.C. 402 for this fiscal year will be expended by or for the benefit of political subdivisions of the State in carrying out local highway safety programs (23 U.S.C. 402(b)(1)(C)) or 95 percent by and for the benefit of Indian tribes (23 U.S.C. 402(h)(2)), unless this requirement is waived in writing. (This provision is not applicable to the District of Columbia, Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.)
5. The State's highway safety program provides adequate and reasonable access for the safe and convenient movement of physically handicapped persons, including those in wheelchairs, across curbs constructed or replaced on or after July 1, 1976, at all pedestrian crosswalks. (23 U.S.C. 402(b)(1)(D))
6. The State will provide for an evidenced-based traffic safety enforcement program to prevent traffic violations, crashes, and crash fatalities and injuries in areas most at risk for such incidents. (23 U.S.C. 402(b)(1)(E))
7. The State will implement activities in support of national highway safety goals to reduce motor vehicle related fatalities that also reflect the primary data-related crash factors within the State, as identified by the State highway safety planning process, including:
 - Participation in the National high-visibility law enforcement mobilizations as identified annually in the NHTSA Communications Calendar, including not less than 3 mobilization campaigns in each fiscal year to –
 - Reduce alcohol-impaired or drug-impaired operation of motor vehicles; and
 - Increase use of seat belts by occupants of motor vehicles;
 - Sustained enforcement of statutes addressing impaired driving, occupant

protection, and driving in excess of posted speed limits;

- An annual Statewide seat belt use survey in accordance with 23 CFR part 1340 for the measurement of State seat belt use rates, except for the Secretary of Interior on behalf of Indian tribes;
- Development of Statewide data systems to provide timely and effective data analysis to support allocation of highway safety resources;
- Coordination of Highway Safety Plan, data collection, and information systems with the State strategic highway safety plan, as defined in 23 U.S.C. 148(a). (23 U.S.C. 402(b)(1)(F))

8. The State will actively encourage all relevant law enforcement agencies in the State to follow the guidelines established for vehicular pursuits issued by the International Association of Chiefs of Police that are currently in effect. (23 U.S.C. 402(j))
9. The State will not expend Section 402 funds to carry out a program to purchase, operate, or maintain an automated traffic enforcement system. (23 U.S.C. 402(c)(4))

I understand that my statements in support of the State's application for Federal grant funds. I sign these Certifications and Assurances based on personal knowledge, and after appropriate inquiry.

Signature, Agency Representative

Date

Printed name of Agency Representative

Subrecipient Financial Risk Assessment FY23

Instructions: Subrecipient must provide information for areas in blue only.

Subrecipient Name:		Project:			
		Award Period:			
	Topic	Yes	No	NA	Comments
A.	Financial Information (Information under Section A must be provided by the Financial Contact for the Subrecipient)				
1	Did the Subrecipient's Parent Entity (City or County) expend more than \$750,000 in federal funding during the previous fiscal year ? If yes , please complete Comments section to indicate whether a single audit through the Federal Audit Clearinghouse (FAC) was conducted in accordance with 2 CFR 200.514. <i>Attach audit summary pages (if applicable).</i>				Amount of Federal Funding Expended \$ _____ Year 20 _____ Audit submitted to FAC? Yes / No Year Audit Completed : _____
2	If the Subrecipient's prior year financial audit did not have any material finding(s) that will affect ITD, check Yes . (If the answer is No , the subrecipient must indicate if/when they were resolved.) <i>Attach a copy of pages showing finding results and corrective plan (if applicable).</i>				Findings: Yes / No Page# _____ Summary pages attached: _____ Findings Resolved: Yes/ No Date: _____
3	Subrecipient shall provide an active Unique Entity Identifier* (UEI) .				UEI # _____ Expiration Date _____
4	Subrecipient agrees to provide timesheets and payroll verification showing overtime was paid on grant-funded activity upon request by OHS.				
5	The Subrecipient agrees to retain documentation records for grant funded activities for up to three years for monitoring by OHS.				
B.	Organization & Grant Management				
1	Has the subrecipient's organization remained unchanged during the previous year ? (i.e. Chief, Sheriff, management staff)				
2	Is the subrecipient's grant management and accounting system the same as the previous year? If not, please explain.				
3	Subrecipient agrees to provide contact/citation activity and mileage logs upon request by OHS.				
4	Subrecipient is aware that equipment purchased through OHS grant funds must be made available for up to three years for inspection.				
Signature on original required by the Parent Entity Financial Contact					
The information above is accurate to the best of my knowledge.				*Unique Entity Identifier (UEI) is now required instead of the DUNS or CAGE numbers, the UEI is available from www.SAM.gov	
Signature:		Date:		Print Name:	
To be completed by The Office of Highway Safety		Yes	No	NA	
C.	Experience				
1	Does the recipient have experience with the same or similar grants?				
2	Has the subrecipient had at least three years of experience with federal grants?				
3	Did the subrecipient consistently and accurately submit their claims and reports on time?				
4	Was payroll and timesheet documentation provided upon request the previous FY? Were there any issues identified?				
TOTALS					
Risk Score:					
Rating Scale (Based on the number of No's)					
0 - 2	Subrecipient is considered low risk.	Low Risk	Provide standard monitoring		
3 - 6	Subrecipient is considered medium risk.	Medium Risk	Provide additional monitoring including training is warranted.		
7 - 10	Subrecipient is considered high risk.	High Risk	Provide close monitoring, training and action if required.		
General overview of Subrecipient performance:					
Commendations, problems or concerns:					
Corrective action necessary:					
OHS Reviewer:		Date:			

COMMITTEE STAFF REPORT

DATE: Monday, September 26, 2022



RESPONSIBLE STAFF

Alisa Anderson, Grants Manager, Nate Suhr, Senior Engineering Technician

ADDITIONAL PRESENTER(S)

OTHER RESOURCES

AGENDA ITEM TITLE

CDBG Park Improvements Request for Additional Funding (ACTION ITEM) - Alisa Anderson / Nate Suhr

DESCRIPTION

The City applied for a \$225,000 Idaho Community Development Grant (ICDBG) for Public Parks ADA Accessibility Improvements from the Idaho Department of Commerce (IDOC) for Mountain View and Indian Hills Parks. The City received a full award and executed a contract on 7/21/2021. The project descriptions and current project costs are attached to this report. Staff is presenting this project update seeking approval to request additional funding from IDOC due to increased construction costs.

The original design and construction project cost estimate was \$250,173, which has now increased by \$148,345 for a new estimated total of \$398,518. Staff has not yet been able to obtain a construction bid to engage a contractor for Mountain View Park Pathway Extension and ADA Improvements estimated to cost \$89,938 and the Indian Hills Restroom Installation and ADA Parking Space estimated at \$87,311. Based on the current construction climate, staff anticipate these numbers could increase by an additional 20 percent. IDOC has additional grant monies for park projects from their original CARES funding allocation.

STAFF RECOMMENDATION

Approval to request additional grant funding in an amount not to exceed \$150,000 from IDOC for the ADA Accessibility Improvement Projects for Mountain View and Indian Hills Parks.

PROPOSED ACTIONS

PROPOSED ACTIONS: Approval to request additional grant funding in an amount not to exceed \$150,000 from IDOC for the ADA Accessibility Improvement Projects for Mountain View and Indian Hills Parks, or provide staff with further direction.

FISCAL IMPACT

The original projected total project cost was \$335,662 to include an Idaho Community Development Block Grant of \$225,000; Grant Administration of \$22,500 and Engineering of \$52,000 (Total City In-Kind Match of \$74,500); and City cash match of \$36,162 funded from Parks Department Capital Improvement Projects accumulation. Additional funds of \$137,356 are needed based on current estimated project costs.

PERSONNEL IMPACT

Engineering, Parks, Finance and Grants Staff

ATTACHMENTS

1. ICDBG Park Project(s) - Cost Increases

Idaho Community Development Block Grant (ICDBG)

Public Parks ADA Accessibility Improvements September 2022 - Project Cost Increases

		Current Cost	
Project 1: Mountain View Park	Original Budget	*Estimate	Cost Increase
Restroom Remodel Design & Construction Management	8,675.00	14,860.00	6,185.00
Restroom Remodel Construction Costs	53,284.00	135,000.00	81,716.00
Pathway Extension and ADA Improvements*	65,210.00	89,938.00 *	24,728.00
Subtotal Mountain View Park	127,169.00	239,798.00	112,629.00
		Current Cost	
Project 2: Indian Hills Park	Original Budget	*Estimate	Cost Increase
Precast Restroom	60,420.00	71,409.00	10,989.00
Restroom Installation and ADA Parking Space*	62,584.00	87,311.00 *	24,727.00
Subtotal Indian Hills Park	123,004.00	158,720.00	35,716.00
Project 1 & Project 2 Combined	Original Budget	Current Cost	Cost Increase
Subtotal Mountain View Park	127,169.00	239,798.00	112,629.00
Subtotal Indian Hills Park	123,004.00	158,720.00	35,716.00
Grand Total	250,173.00	398,518.00	148,345.00

ICDBG Award and Project Description(s)

The City applied for a \$225,000 Idaho Community Development Grant (ICDBG) for Public Parks Improvements from the Idaho Department of Commerce (IDOC) on September 21, 2020 and received notice of award for the full amount on November 2, 2020. The request included ADA improvements at both Mountain View Park and Indian Hills Park. The proposed combined projects will create an interconnected system of ADA available parking, pathways, and facilities that will allow full use of both parks for all members of the community. The projects are further described as follows:

The Mountain View Park improvements create an interconnected system of ADA accessible parking, pathways, and facilities that will allow full use of both park areas for all members of the community. These improvements include the installation an ADA-compliant concrete pathway including retaining walls, handrails, and curb ramps connecting the north and south parking lot (designating ADA parking spaces) and the basketball/pickleball courts. The project also includes remodeling of the existing restroom to provide four (4) individual ADA accessible gender-neutral family restrooms.

The Indian Hills Park project includes the installation of an ADA accessible prefabricated concrete gender-neutral family restroom and an ADA compliant parallel parking space. These improvements will create amenities to encourage inclusivity of a wider spectrum of park patrons and to improve accessibility for all community members. The addition of a restroom will allow park patrons to spend more time at the park. The project includes the excavation of soil, installation and connection of sanitary, electrical, and water service lines to the restroom, installation of a five (5) inch thick concrete sidewalk, and the pouring of hot mixed asphalt for the new ADA parking space.