

SPECIFICATIONS, PROPOSAL AND CONTRACT DOCUMENTS

**Contract No. 2020-01; Lake Forest Park Reservoir and
Booster Station Upgrades**

Northshore Utility District
King County, Washington

OCTOBER 2020
C1502

**NORTHSHORE UTILITY DISTRICT
King County, Washington**

District Commissioners

**Thomas D. Mortimer, President
Matt Breysse, Secretary
D. Bruce Gardiner
Trudy Rolla
Don Ellis**

General Manager

Alan G. Nelson

District Office

**6830 NE 185th Street
Kenmore, WA 98028
Phone (425) 398-4400
Fax (425) 398-4430
www.nud.net**

CERTIFICATE OF ENGINEER



Specification Section(s) listed below were developed by, or under the direct supervision of Eric Delfel, of Gray & Osborne, Inc.

Specification Section(s):

- 1.1 Project Description
- 2.2 Contract Plans
- 2.3 Permits, Franchises and Easements
- 3.0 Engineering Specifications
- 4.0 Measurement and Payment
- 5.0 Proposal



10/14/2020

NORTHSHORE UTILITY DISTRICT

**6830 NE 185TH STREET
KENMORE, WASHINGTON 98028-2684**

SPECIFICATIONS, PROPOSAL AND CONTRACT DOCUMENTS

**FOR
CONTRACT 2020-01
Lake Forest Park Reservoir and Booster Station Upgrades**

TABLE OF CONTENTS

Call for Bids

Section 1 Instructions to Bidders

Section 2 Special Provisions

Section 3 Engineering Specifications

Division 1 – General Technical Requirements

Division 2 – Sitework

Division 3 – Concrete

Division 7 – Thermal and Moisture Protection

Division 8 – Doors and Windows

Division 9 – Finishes

Division 13 – Special Construction

Division 15 – Mechanical

Division 16 – Electrical

Section 4 Measurement and Payment

Section 5 Proposal & Bid Bond

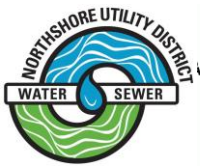
Section 6 Contract & Performance, Payment and Guaranty Bond

Section 7 Definitions and Abbreviations

Section 8 General Conditions

Appendices

Appendix A – Quality Controls Corporation



NORTHSHORE UTILITY DISTRICT

6830 NE 185TH STREET
KENMORE, WASHINGTON 98028-2684

CALL FOR BIDS

Notice is hereby given that Northshore Utility District ("District") will receive sealed bids for the following construction project. Bids will be received at the District office, located at 6830 - NE 185th Street, Kenmore, Washington, by mail or other courier up to the hour of **2:00 p.m. on Tuesday, November 10, 2020**. A District Representative will accept bids by hand delivery from 1:00 p.m. to 2:00 p.m. on November 10, 2020 at the main entrance of the District Office, after which all bids will be publicly opened and read to determine the apparent lowest bidder. Due to COVID-19, the public bid opening will be conducted remotely. Bidders may attend the Bid Opening online using Microsoft Teams. To attend the bid opening, use the following link:

https://teams.microsoft.com/join/19%3ameeting_M2ZkYtQzYzctZjY0Ni00NjcwLTg1NGEtMDgyMzc4NmFkZjU4%40thread.v2/0?context=%7b%22Tid%22%3a%2212be7aec-d322-415c-ade4-47fe173f2e89%22%2c%22Oid%22%3a%228426b123-cd3c-4de1-9e29-7bb4e38195cf%22%7d

[+1 253-328-7749](tel:+12533287749)

Conference ID: 477 932 06#

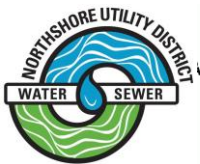
Please contact the District's IT Department at 425-398-4411 if you experience any issues.

Project Description

Contract 2020-01; Lake Forest Park Reservoir and Booster Station Upgrades

The project consists of the following work:

The project includes improvements to the District's Lake Forest Park Reservoir and Booster Pump Station. The improvements at the Lake Forest Park Reservoir include demolition and replacement of existing site fencing, installation of new double swing access gate, installation of new access man gate, waterproofing guardrail and posts along the parapet wall, installation of new vehicular wheel stops, installation of a new roof access hatch, modification



of existing reservoir access hatch into a roof vent hatches, and associated site restoration.

The improvements to the booster pump station include installation of new electrical vault, demolition, removal and waste haul of an existing generator and associated appurtenances, installation of new remote fuel fill station and alarm panel, installation of new generator and associated appurtenances, modifications to existing booster station door thresholds and installation of window glazing, and painting of interior and exterior of the station, including floors. Electrical improvements to the booster pump station include modification of existing utility service conduit routing, installation of new utility service meter base, installation of new automatic transfer switch, installation of new manual transfer switch and associated electrical, installation of a load bank connection, installation of new power quality panel, installation of new motor starters and installation of new power distribution panel.

The contractor will be required to work with the District's control systems integrator, Quality Controls Corporation as subcontractors for the project.

Approximate locations of the proposed improvements are shown on the project construction plans.

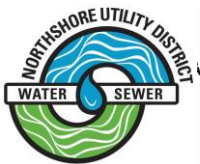
The engineer's construction cost estimate is \$775,000.00 including sales tax.

Free-of-charge access to project bid documents (plans, specifications, addenda, and Bidders List) is provided to Prime Bidders, Subcontractors, and Vendors by going to www.bxwa.com and clicking on "Posted Projects", "Public Works", and "Northshore Utility District". This online plan room provides Bidders with fully usable online documents with the ability to: download, view, print, order full/partial plan sets from numerous reprographic sources, and a free online digitizer/take-off tool. It is recommended that Bidders "Register" in order to receive automatic email notification of future addenda and to place themselves on the "Self-Registered Bidders List". Bidders that do not register will not be automatically notified of addenda and will need to periodically check the on-line plan room for addenda issued on this project. Contact Builders Exchange of Washington at (425) 258-1303 should you require assistance with access or registration.

Bid documents (in PDF format) are also directly available from the District's website at the following address:

<http://www.nud.net/about-us/departments/engineering/capital-improvement-program>

Bid documents are also available free of charge at the following web site <http://gobids.grayandosborne.com>. Bidders are encouraged to register in order



to receive email notification of future addenda and to be placed on the Bidder's List.

Each bid must be submitted on the "Proposal" forms provided in Section 5 of the "Specifications, Proposal and Contract Documents" and shall be accompanied by a bid proposal deposit in the form of a surety bond, postal money order, cashier's check or certified check made payable to King County Treasurer, King County, Washington for a sum of not less than 5 per cent of the total bid. A bid shall not be considered unless accompanied by such bid proposal deposit.

CONTRACT AWARD

A contract, if awarded, will be based upon the lowest responsive and responsible bid or bids as defined in more detail in the bid documents.

Northshore Utility District reserves the right to reject any and all bids, to delete portions or all of the work, to substitute alternative bid item prices for base bid item prices, to waive any informality in bidding, and to make the award deemed to be in the best interest of the District.

Proposals received after the time announced for the opening will not be considered. No bidder may withdraw its bid after the time announced for the opening or before the award and execution of the contract(s) unless the award is delayed for a period exceeding sixty (60) calendar days.

Advertised in the Daily Journal of Commerce on Monday, October 19, 2020, and Monday, October 26, 2020.

NORTHSHORE UTILITY DISTRICT
Matt Breyse, Secretary
Board of Commissioners

INSTRUCTIONS TO BIDDERS

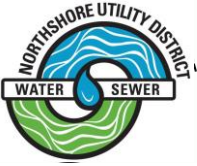


TABLE OF CONTENTS

SECTION 1

INSTRUCTIONS TO BIDDERS

1.0	GENERAL	1
1.1	PROJECT DESCRIPTION.....	1
1.2	EXAMINATION OF PLANS, SPECIFICATIONS AND SITE	2
1.3	PROPOSALS	3
1.4	BID PROPOSAL DEPOSIT.....	3
1.5	BIDDING ERRORS.....	4
1.6	COMPLETION TIME AND LIQUIDATED DAMAGES	4
1.7	AWARD OF CONTRACT AND NOTICE TO PROCEED	5
1.8	FAILURE TO EXECUTE CONTRACT	5
1.9	CORRECTIONS, INTERPRETATIONS AND ADDENDA	6
1.10	ENGINEER AND NOTICES.....	6
1.11	BIDDER RESPONSIBILITY CRITERIA	6
1.12	SUBCONTRACTORS.....	6
1.13	SUBCONTRACTOR RESPONSIBILITY CRITERIA	7
1.14	NON-COLLUSION DECLARATION.....	8



Section 1 - Instructions to Bidders

1.0 GENERAL

Plans and specifications are on file at:

Northshore Utility District
6830 NE 185th Street
Kenmore, WA 98028

Free-of-charge access to project bid documents (plans, specifications, addenda, and Bidders List) is provided to Prime Bidders, Subcontractors, and Vendors by going to Builders Exchange of Washington's web site at the following address: http://www.bxwa.com/bxwa_toc/pub/827.html. This online plan room provides Bidders with fully usable online documents with the ability to: download, view, print, order full/partial plan sets from numerous reprographic sources, and a free online digitizer/take-off tool. It is recommended that Bidders "Register" in order to receive automatic email notification of future addenda and to place themselves on the "Self-Registered Bidders List". Bidders that do not register will not be automatically notified of addenda and will need to periodically check the online plan room for addenda issued on this project. Contact Builders Exchange of Washington at (425) 258-1303 should you require assistance with access or registration.

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<http://www.nud.net/about-us/departments/engineering/capital-improvement-program>

Bid documents are also available free of charge at the following web site <http://gobids.grayandosborne.com>. Bidders are encouraged to register in order to receive email notification of future addenda and to be placed on the Bidder's List.

1.1 PROJECT DESCRIPTION

Contract 2020-01; Lake Forest Park Reservoir and Booster Station Upgrades
The project consists of the following work:

The project includes improvements to the District's Lake Forest Park Reservoir and Booster Pump Station. The improvements at the Lake Forest Park Reservoir include demolition and replacement of existing site fencing, installation of new double swing access gate, installation of new access man



gate, waterproofing guardrail and posts along the parapet wall, installation of new vehicular wheel stops, installation of a new roof access hatch, modification of existing reservoir access hatch into a roof vent hatches, and associated site restoration and paving.

The improvements to the booster pump station include installation of new electrical vault, demolition, removal and waste haul of an existing generator and associated appurtenances, installation of new remote fuel fill station and alarm panel, installation of new generator and associated appurtenances, modifications to existing booster station door thresholds and installation of window glazing, and painting of interior and exterior of the station, including floors. Electrical improvements to the booster pump station include modification of existing utility service conduit routing, installation of new utility service meter base, installation of new automatic transfer switch, installation of new manual transfer switch and associated electrical, installation of a load bank connection, installation of new power quality panel, installation of new motor starters and installation of new power distribution panel.

The contractor will be required to work with the Districts's control systems intergrator, Quality Controls Corporation as subcontractors for the project.

1.2 EXAMINATION OF PLANS, SPECIFICATIONS AND SITE

Bidders shall satisfy themselves as to construction conditions by personal examination of the plans, specifications and site of the proposed work and by any other examination and investigation, which they may desire to make as to the nature of the work, estimate of quantities and difficulties to be encountered. Bidders shall consider Federal, State, and local laws and regulations that may affect cost, progress, or performance of the work.

The Bidders are hereby notified that geotechnical investigations were not conducted by the District for this project.

The Bidder shall perform its own subsurface explorations to satisfy itself of the true nature of the soils to be encountered.

Before submitting a bid, each bidder will, at the bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface, and underground utilities) at or contiguous to the site or otherwise which may affect cost, progress, or performance of the work in which the bidder deems necessary to determine its bid for performing the work in accordance with the time, price, and other terms and conditions of the Specifications, Proposal and Contract Documents. The



bidder shall be responsible for all costs associated with these additional examinations including all restoration work and damages which may be a result of such investigation.

A pre-bid conference is scheduled for October 27, 2020 from 10:00 a.m. to 1:00 p.m. by appointment only. The conference will begin at the contractor staging area identified on the plans. Prospective bidders are encouraged to participate. Appointments will be scheduled in 15-minute increments and shall be limited to two people maximum. All attendees are required to comply with all state, county, and local requirements for COVID-19. To schedule an appointment, prospective bidders shall call Eric Delfel, P.E. of Gray & Osborne, Inc., by calling 206-284-0860. No unauthorized visits or unscheduled visits will be allowed.

1.3 PROPOSALS

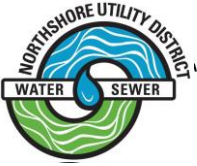
Proposals shall be made on the forms included herewith under the "Proposal" section and shall be provided to the District in a sealed envelope addressed as follows:

Northshore Utility District
6830 NE 185th Street
Kenmore, WA 98028
Attention: Proposal Enclosed

Proposals shall arrive not later than Tuesday, November 10, 2020, at 2:00 p.m., at which time and place they will be opened and publicly read aloud. No proposal may be withdrawn after the time stated above or before award of contract unless said award is delayed for a period exceeding 60 calendar days.

1.4 BID PROPOSAL DEPOSIT

As a guarantee of good faith and as required by law, each bid shall be accompanied by a bid proposal deposit in the form of a certified check, cashier's check, postal money order or surety bond payable to the order of the King County Treasurer, King County Washington for an amount not less than five per cent (5%) of the total amount of the bid. The deposits of the three low bidders will be retained until a contract has been entered into between the successful bidder and the District and until a performance bond in an amount of 100 percent of the contract price has been filed as required under these contract documents. The deposits of other bidders will be returned as soon as it is determined that they are not one of the three low bidders.



1.5 BIDDING ERRORS

The District will not consider a claim of error in a proposal unless such claim is made to the District within eight (8) business hours after the time of bid opening as stated in the “Call for Bids” and unless supporting evidence of such claim, including cost breakdown sheets, is delivered to the District within ten (10) business hours after the time of bid opening as stated in the “Call for Bids.”

If the District is, at its sole determination, convinced that the bidder has committed an unintentional error, the bidder will be allowed to withdraw, but not correct, its bid.

1.6 COMPLETION TIME AND LIQUIDATED DAMAGES

Subject to time lost due to inclement weather and delay in delivery of materials, should such delay not be the result of the Bidder’s actions, the Bidder must agree to complete all of the work in 187 calendar days, all beginning with the date of written “Notice to Proceed” with the work.

In summary, the District’s intended schedule for the project is as follows:

Contract Award	Monday, November 16, 2020
Execute Contract	Monday, November 30, 2020
Issue Notice to Proceed for Submittals	Tuesday, December 1, 2020
Receive & Review Material Submittals	Friday, December 11, 2020
Preconstruction Conference	Tuesday, January 26, 2021
Issue Notice to Proceed for Construction	Monday, February 01, 2021
Complete Construction	Saturday, June 05, 2021

The Bidder agrees to complete the work within the contract time as above-specified plus any Extension as provided for herein (“Completion Time”). Such Extension and events producing them shall not be grounds for claim by the Bidder of damages or for additional costs, expenses, overhead, profit or other compensation. It is the responsibility of the Bidder to complete the work within the Completion Time. The District makes no promise or representation that this can or will be done.

The District and the Bidder recognize that time is of the essence of this Contract and that the District will suffer financial loss if the work is not completed within Completion Time. They also recognize the delays, expense, and difficulties in proving the actual loss suffered by the District if the work is not completed on time. Accordingly, instead of requiring any such proof, the District and the bidder agree that as liquidated damages for delay (but not as a penalty) the



bidder shall pay the District \$1400.00 for each day that expires after Completion Time.

1.7 AWARD OF CONTRACT AND NOTICE TO PROCEED

A contract will not be awarded until the District is satisfied that (1) the successful bidder is reasonably familiar with the class of work contemplated and has the necessary capital, tools and experience to satisfactorily perform the work within the time stated, (2) the successful bidder meets the mandatory responsibility criteria identified in RCW 39.04.350 (for prime contractors) and RCW 39.06.020 (for first tier subcontractors and subcontractors of any tier that are hired by other subcontractors), and (3) the successful bidder demonstrates its compliance with any Supplemental Bidder Responsibility Criteria or requirements identified herein. Completion of the work within Completion Time is essential and prior commitments of the bidder, failure to complete other work on time, or reasonable doubt as to whether the bidder would complete the work on time, would also be cause for the rejection of any bidder as not responsible.

The right is reserved by the District to waive any immaterial bid errors or irregularities in the bidding and reserves the right to correct arithmetical errors or discrepancies between unit prices and extended amounts if the intended bid is ascertainable from the face of the bid. Bidders are also advised that the District may reject any bid or proposal or all bids or proposals for any or no reason, including (1) any bid or proposal that in the opinion of the District is unbalanced or that contains unit prices that fail to reflect the actual cost of construction, (2) any bid or proposal that lacks necessary detail or specificity or is otherwise found to be non-responsive, and (3) any bid that violates the terms of these instructions. Bidders acknowledge that they are not entitled to any compensation, costs or damages related to bid preparation or resulting from District's decision to cancel the procurement, reject any or all bids or otherwise refuse to execute a contract. District, in its sole discretion, may re-advertise for new proposals or to otherwise carry out the work. The District further reserves the right to delete portions or all of the work or schedules of the work in its sole discretion and thereafter to award a contract to the successful bidder on the remaining portions of the work.

1.8 FAILURE TO EXECUTE CONTRACT

In the event the successful bidder fails to furnish an approved bond and to sign the contract within ten days after notification by the District, an amount equal to 5 percent of the amount of the bid shall be forfeited to the District as liquidated damages. Said liquidated damages shall be paid from the certified check or bid bond submitted with the bid. Other proposals will then be reconsidered for award by the District.



1.9 CORRECTIONS, INTERPRETATIONS AND ADDENDA

Any omissions, discrepancies or need for interpretations or explanations of the Contract Documents shall be in the form of an addendum and no oral statements by the District, District Engineer, District's Consulting Engineer, or other representative of the District shall, in any way, modify these contract documents, whether made before or after letting the contract.

1.10 ENGINEER AND NOTICES

Notices as required shall be mailed to the attention of the project engineer as follows:

Gray & Osborne, Inc.
Attention: Eric Delfel, P.E.
1130 Rainier Avenue South, Suite 300
Seattle, WA 98144

1.11 BIDDER RESPONSIBILITY CRITERIA

Bidder must meet the following Bidder Responsibility Criteria (RCW 39.04.350) to be considered a responsible bidder. Bidder will be required to complete and submit the Bidder Responsibility Checklist, included with the "Proposal" section of this document, with the bid. The bidder must:

- (a) Have a current certificate of registration as a contractor in compliance with chapter 18.27 RCW, which must have been in effect at the time of bid submittal;
- (b) Have a current Washington Unified Business Identifier (UBI) number;
- (c) Have Industrial Insurance (workers' compensation) coverage for the bidder's employees working in Washington, as required in Title 51 RCW;
- (d) Have a Washington Employment Security Department number, as required in Title 50 RCW;
- (e) Have a Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW.
- (f) Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).

1.12 SUBCONTRACTORS

Consistent with RCW 39.30.060, each bidder on a project in excess of \$1,000,000 is required to submit the completed "Proposed Subcontractors" list



included in the "Proposal" section either with the bid or within one hour of the required bid submittal time as stated in the Call for Bids or by written addendum. The completed list must identify each subcontractor who will perform heating, ventilation and air-conditioning, or plumbing as described in Chapter 18.106 RCW, and electrical as described in Chapter 19.28 RCW, or the contractor must name itself for the work. The form may be submitted in person or by facsimile (FAX number (206) 283-3206) to:

Gray & Osborne, Inc.
Attention: Eric Delfel, P.E.
1130 Rainier Avenue South, Suite 300
Seattle, WA 98144

Receipt of the form by Northshore Utility District within the time prescribed is the responsibility of the bidder.

The bidder shall not list more than one subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the bidder must indicate which subcontractor will be used for which alternates.

Failure of the bidder to submit as part of the bid the names of such subcontractors, or name itself to perform such work, or the naming of two or more subcontractors to perform the work, shall render the bidder's bid as nonresponsive and therefore void.

1.13 SUBCONTRACTOR RESPONSIBILITY CRITERIA

To comply with RCW 39.06.020, the following is required:

- (a) The successful bidder shall provide documentation to District demonstrating that the first-tier subcontractor meets the Subcontractor Responsibility Criteria below. The requirements of this subsection apply to all subcontractors regardless of tier.
- (b) At the time of subcontract execution, the successful bidder to whom the Contract is to be awarded shall verify that each of its first tier subcontractors meets the following bidder responsibility criteria:
 1. Have a current certificate of registration in compliance with chapter 18.27 RCW, which must have been in effect at the time of subcontract bid submittal;
 2. Have a current Washington Unified Business Identifier (UBI) number;



3. Have Industrial Insurance (workers' compensation) coverage for the subcontractor's employees working in Washington, as required in Title 51 RCW;
 4. A Washington Employment Security Department number, as required in Title 50 RCW;
 5. A Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
 6. An electrical contractor license, if required by Chapter 19.28 RCW;
 7. An elevator contractor license, if required by Chapter 70.87 RCW.
 8. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065 (3).
- (c) Bidder will be required to complete and submit the "Subcontractor Responsibility Criteria" form, included in the "Proposal" section of this document, either with the bid or within two hours of the required bid submittal time.

1.14 NON-COLLUSION DECLARATION

Submit the non-collusion declaration as part of the bid. No person, firm, or corporation shall be allowed to make, file, or be interested in more than one proposal for the same work, unless alternative proposals are invited. A person, firm, or corporation who has submitted a sub-proposal to a bidder, or who has quoted prices on materials to a bidder, is not thereby disqualified from submitting a proposal, or quoting prices to other bidders.

Reasonable grounds for believing that any bidder is interested in more than one proposal for the work will cause the rejection of all proposals in which said bidder is interested. If there is reason to believe that collusion exists among the bidders, none of the participants in such collusion will be considered.

SPECIAL PROVISIONS



TABLE OF CONTENTS

SECTION 2

SPECIAL PROVISIONS

2.1	OBSERVATION OF THE WORK	1
2.2	THE CONTRACT PLANS	2
2.3	PERMITS, FRANCHISES AND EASEMENTS.....	3
2.4	STAKING.....	3
2.5	CERTIFICATE OF INSURANCE.....	3
2.6	PAYMENT FOR MATERIALS ON HAND.....	4
2.7	SAFETY PLAN	4
	INSURANCE COVERAGE QUESTIONNAIRE.....	5
	ENDORSEMENT	6
	PROPERTY OWNER’S APPROVAL OF RESTORATION.....	7



Section 2 – Special Provisions

2.1 OBSERVATION OF THE WORK

Work will not be allowed on Saturdays, Sundays or legally recognized holidays without written permission from the Engineer. If the Contractor is granted permission for such work, then the District may, at the District's sole discretion, deduct moneys from the Contractor in the amount of One Thousand Four Hundred Dollars (\$1,400) per day or fraction thereof for reimbursement to the District for its reasonable inspection and engineering fees.

District Holidays

- New Year's Day..... January 1
- Martin Luther King Day..... Third Monday in January
- President's Day Third Monday in February
- Memorial Day Last Monday in May
- Independence Day July 4
- Labor Day..... First Monday in September
- Veteran's Day..... November 11
- Thanksgiving Day..... Fourth Thursday in November
- Day After Thanksgiving Fourth Friday in November
- Christmas Day..... December 25



2.2 THE CONTRACT PLANS

The Contract Plans consist of the following sheets:

SHEET NO.	SHEET TITLE
1	COVER SHEET, SHEET INDEX AND VICINITY MAP
2	TESC DETAILS AND NOTES
3	ABBREVIATIONS & KEY MAP
4	EXISTING RESERVOIR SITE TESC AND DEMO PLAN
5	RESERVOIR SITE PLAN
6	RESERVOIR DETAILS
7	RESERVOIR DETAILS
8	RESERVOIR DETAILS
9	EXISTING BOOSTER STATION SITE & TESC PLAN
10	BOOSTER STATION SITE & RESTORATION PLAN
11	BOOSTER STATION DEMOLITION PLAN AND DETAILS
12	CONCRETE SLAB DEMOLITION & PROPOSED PLANS AND DETAILS
13	BOOSTER STATION MODIFICATIONS PLAN AND SECTION
14	BOOSTER PUMP STATION MODIFICATIONS SECTIONS AND DETAILS
15	DETAILS
16	ELECTRICAL SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES
17	SITE ELECTRICAL PLAN, TAG LIST AND WORK SUMMARY
18	EXISTING ONE LINE DIAGRAM
19	ONE LINE DIAGRAM
20	ELECTRICAL BUILDING PLAN
21	EXTERIOR NORTH WALL ELECTRICAL DEMOLITION AND MODIFIED ELECTRICAL ELEVATION
22	DEMO/MODIFIED INTERIOR NORTH WALL ELEVATIONS
23	DEMO/MODIFIED INTERIOR EAST WALL ELEVATIONS
24	MOTOR STARTER ELEMENTARY WIRING DIAGRAM
25	MOTOR STARTER ELEMENTARY WIRING DIAGRAM
26	MOTOR STARTER ELEVATION
27	CABLE AND CONDUIT SCHEDULES
28	ELECTRICAL DETAILS



2.3 PERMITS, FRANCHISES AND EASEMENTS

Except as noted below, the Contractor shall be responsible for obtaining and paying all fees associated with all the necessary permits, licenses, approvals, and construction permits for the execution of this Contract, whether they be city, County, State, or federal permits.

The District is in possession of, or will be responsible for obtaining the following approvals and permits, and will pay the fees associated with the application and procurement of such approvals and permits. The Contractor is advised to become familiar with these approvals and permits as necessary for this project. The Contractor shall comply with all conditions of each approval/permit as if the conditions here detailed herein. Copies of all permits are required to be onsite at all times.

- Puget Sound Clean Air Agency Notice of Construction and Application for Approval (Obtained by District)
- King County Fire Protection District No. 16 Application to Remove, Abandon or Install Flammable Combustible Liquid Tanks (applied, paid for and obtained by Contractor)
- Washington State Department of Ecology Underground Storage Tank Permanent Closure per WAC 173-360A (applied, paid for and obtained by Contractor)

2.4 STAKING

All work done under this Contract shall be done to the lines and grades shown on the Plans. The District will provide one set of construction stakes. Stakes removed or destroyed will be replaced by the District at the Contractor's request and expense.

The Contractor shall notify the District a minimum of 5 working days in advance of the need for staking.

2.5 CERTIFICATE OF INSURANCE

The Contractor shall specifically note and comply with the limits of liability amounts, additional insured named and terms of cancellation included in Subsection 8.9 of the General Conditions. Additional insureds shall include Northshore Utility District, its agents and representatives, and the City of Lake Forest Park. All Risk Builders' Risk coverage will not be required for this Project.



The Insurance Questionnaire and Endorsement included at the end of this section must be completed in addition to the Certificate of Insurance.

2.6 PAYMENT FOR MATERIALS ON HAND

Payment for materials on hand will not be provided for this project.

2.7 SAFETY PLAN

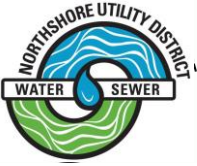
In response to COVID-19, the Contractor shall prepare a project specific COVID-19 Health and Safety Plan (CHSP).

The CHSP shall be prepared and submitted prior to beginning physical Work. The CHSP shall be based on the most current State and Federal requirements. If the State and Federal requirements are revised, the CHSP shall be updated as necessary to conform to the current requirements.

The Contractor shall update and resubmit the CHSP as the work progresses and new activities appear on the Look Ahead Schedule required under Section 3.04.15(1). If the conditions change on the project, or a particular activity, the Contractor shall update and resubmit the CHSP. Work on any activity shall cease if conditions prevent full compliance with the CHSP.

The CHSP shall address the health and safety of all people associated with the project including Owner representatives and workers in the field, Contractor personnel, consultants, project staff, subcontractors, suppliers and anyone on the project site, staging areas, or yards.

Costs for development and implementation of the CHSP shall be incidental and included within the unit bid prices in the Contract.



Insurance Coverage Questionnaire

This Questionnaire must be completed and attached to Certificate of Insurance.

Name of Contractor: _____

Contract Number: Contract 2020-01; Lake Forest Park Reservoir and Booster Station Upgrades

Project Owner: Northshore Utility District

Are the following coverage's and/or conditions in effect?

Please circle "yes" or "no" regarding the applicable policy		
This Policy Form is ISO Commercial General Liability form CG 00 01 or CG 00 02 (circle one). If no, attach a copy of the policy with required coverage clearly identified.	Yes	No
Products and Completed Operation Coverage	Yes	No
Cross Liability Clause (or equivalent wording)	Yes	No
Personal Injury Liability Coverage (with Employee Exclusion Deleted)	Yes	No
Broad Form Property Damage with X, C, U Hazards Included	Yes	No
Blanket Contractual Liability Coverage Applying to this Contract	Yes	No
Employers Liability - Stop Gap	Yes	No

	GL	AL	Excess
Deductibles or SIR's			
Insurer's A.M. Best Rating			

This Questionnaire is issued as a matter of information. This questionnaire is not an insurance policy and does not amend, extend or alter the coverage afforded by the policies indicated on the attached Certificate of Insurance.

Agency/Broker

COMPLETED BY (PRINT NAME)

Address

Completed by (signature)

Name of Person to Contact

Phone Number



Endorsement

In consideration of the premium charge, it is hereby agreed and understood that Policy # _____ issued by _____ Insurance Company, is amended to include the following terms and conditions as respects Contract 2020-01; Lake Forest Park Reservoir and Booster Station Upgrades issued by NORTHSHORE UTILITY DISTRICT.

1. **INSURED.** The DISTRICT, the CITY OF LAKE FOREST PARK AND ENGINEER, their elected or appointed officers, officials, employees and volunteers are included as insureds, with regard to damages and defense of claims arising from: (a) activities performed by or on behalf of the NAMED INSUREDS; or (b) products and completed operations of the NAMED INSUREDS; or (c) premises owned, leased or used by the NAMED INSUREDS.
2. **CONTRIBUTION NOT REQUIRED.** As respects: (a) work performed by the NAMED INSUREDS for or on behalf of the District; or (b) products sold by the NAMED INSUREDS to the District; or (c) premises leased by the NAMED INSUREDS from the District, the insurance afforded by this policy shall be primary insurance as respects the District, its elected or appointed officers, officials, employees or volunteers; or stand in an unbroken chain of coverage excess of the NAMED INSUREDS scheduled underlying primary coverage. In either event, any other insurance maintained by the District, its elected or appointed officers, officials, employees or volunteers shall be in excess of this insurance and shall not contribute with it.
3. **SEVERABILITY OF INTEREST.** The inclusion of more than one Insured under this policy shall not affect the rights of any Insured as respects any claim, suit or judgment made or brought by or for any other Insured or by or for any employee of any other insured. This policy shall protect each Insured in the same manner as though a separate policy had been issued to each, except that nothing herein shall operate to increase the company's liability beyond the amount or amounts for which the company would have been liable had only one insured been named.
4. **CANCELLATION NOTICE.** The insurance afforded by this policy shall not be suspended, voided, canceled, reduced in coverage or in limits except after **forty-five (45) days** prior written notice by certified mail, return receipt requested has been given to the DISTRICT. Such notice shall be addressed to: (a) the DISTRICT, and (b) the Washington Cities Insurance Authority, PO BOX 88030, Tukwila, WA 98138, (206)575-6046.
5. **CLAIM REPORTING.** The District has no obligation to report occurrences unless a claim has been filed with the District Board of Commissioners.
6. **AGGREGATE LIMIT.** The General Aggregate Limit under Limits of Insurance applies separately to the above named contract for the above named district.

Date: _____

Authorized Representative

Signature



Property Owner's Approval of Restoration

CONTRACT _____

I, (We), the undersigned Owner(s) of property identified as:

Address: _____

Property Description Or Tax Lot Number: _____

do hereby approve and accept the restoration work done on, over and across
my, (our), property by:

_____,the

Contractor for the Contract 2020-01; Lake Forest Park Reservoir and Booster
Station Upgrades

SIGNED: _____ Date: _____

SIGNED: _____ Date: _____

ENGINEERING SPECIFICATIONS

ENGINEERING SPECIFICATIONS

TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE
Division 1 General Technical Requirements		
01110	Summary of Work.....	01110-1
01300	Submittals.....	01300-1
01310	Project Meetings.....	01310-1
01385	Documentation of Existing Conditions.....	01385-1
01400	Quality Control.....	01400-1
01500	Temporary Facilities.....	01500-1
01720	Record Drawings.....	01720-1
01800	Testing, Commissioning, and Training.....	01800-1
01900	Salvage and Demolition.....	01900-1
Division 2 Sitework		
02050	Locate Existing Utilities.....	02050-1
02250	Temporary Shoring and Bracing.....	02250-1
02300	Earthwork.....	02300-1
02305	Wet Weather Earthwork.....	02305-1
02370	Erosion Control.....	02370-1
02530	Utility Structures.....	02530-1
02534	Storm Sewers.....	02534-1
02700	Gravel Materials.....	02700-1
02740	Hot Mix Asphalt Paving.....	02740-1
02820	Chain Link Fence and Gate.....	02820-1
02950	Site Restoration and Rehabilitation.....	02950-1
Division 3 Concrete		
03300	Cast-In-Place Concrete.....	03300-1
Divisions 4 through 6		
Not Used		
Division 7 Thermal and Moisture Protection		
07900	Caulking and Sealants.....	07540-1
Division 8 Doors and Windows		
08310	Metal Access Hatches.....	08310-1
08810	Glazing.....	08810-1

SECTION	DESCRIPTION	PAGE
Division 9 Finishes		
09900	Painting	09900-1
Divisions 10 through 11		
Not Used		
Division 12 Furnishings		
Not Used		
Division 13 Special Construction		
13250	Decommissioning of Underground Fuel Storage Tanks	13250-1
Division 14 Conveying Systems		
Not Used		
Division 15 Mechanical		
15066	Pipe and Conduit Support System	15066-1
15150	Diesel Generator Fuel System	15150-1
15550	Generator Engine Exhaust System	15550-1
Division 16 Electrical		
16050	Basic Electrical Materials and Methods	16050-1
16060	Grounding and Bonding.....	16060-1
16120	Conductors and Cables	16120-1
16130	Raceway and Boxes.....	16130-1
16140	Wiring Devices	16140-1
16210	Electrical Utility Services	16210-1
16230	Generator Assemblies	16230-1
16410	Enclosed Switches, Fuses, and Circuit Breakers	16410-1

DIVISION 1

GENERAL TECHNICAL REQUIREMENTS

SECTION 01110

SUMMARY OF WORK

PART 1 GENERAL

1.1 SCOPE OF WORK

The work specified in this Section consists of furnishing all labor, materials, and equipment necessary for modifications to the existing Lake Forest Park Reservoir and Booster Station, as shown on the Plans and hereinafter specified. Work shall include, but not be limited to the following components:

- A. Remove and wastehaul an existing diesel generator, and install a new diesel generator with sub-base fuel tank and fuel fill system.
- B. Remove and wastehaul existing reservoir site fencing, as indicated on the plans and install new site fencing and entry gates,
- C. Decommission and abandon in place in accordance with WAC 173-360A existing 300-gallon diesel underground storage tank and restore landscaping to its original condition,
- D. Install a subgrade electrical vault within the existing booster station access road,
- E. Install reservoir guardrail water proofing, modify existing reservoir hatch to install a new roof vent and install two new roof access hatches as shown on the Plans,
- F. Reservoir site drainage improvements,
- G. Modify the existing electrical and control system as shown on the Plans including new variable frequency drives and solid state motor starters,
- H. Install bollards and wheel stops,
- I. Startup, test, and commission the new equipment to the satisfaction of the Owner, motor starters and VFDs shall be installed one at a time so that the station can remain in service.

1.2 PROJECT INFORMATION

The Contract Documents show the location, arrangement, and type of work to be performed under the proposed project.

The Contractor shall be responsible for proper notification to and coordination with all utility districts, service districts, and all other persons and services that will be affected by this project at least one week in advance of beginning any construction that affects them.

It is the intent and purpose of these Contract Documents to have constructed complete facilities in good working order for the least practical cost to the Owner. Suggestions, recommendations, as well as inquiries from the Contractor that will serve this purpose are welcome and will be given consideration by the Owner and the Engineer.

1.3 CONTRACTOR USE OF SITE AND PREMISES

Construction operations shall be limited to the areas noted on Sheet 3 of the Plans and subject to the approval of the Engineer.

The Contractor shall allow representatives of the funding and regulatory agencies access to the project site at all times.

The Contractor shall notify the Owner at least 72 hours in advance of any proposed water system shut downs. The Owner shall be responsible for notifying all impacted water users in advance of any water system shut-downs.

1.4 ORDER OF WORK

The order of work will be at the option of the Contractor in keeping with good construction practice, time restrictions, requirements of the permits applicable to this project, and the order of work as outlined herein, all costs of which shall be included in the various bid amounts. The Contractor shall conduct the order of work to allow the existing facilities to remain operational during the construction of the Project and shall coordinate all of his activities through the Engineer with the Owner's operations and maintenance staff. Each week, the Contractor shall provide a written plan of activities for the following week to the Engineer and Owner for review and coordination with existing facility operations.

The implementation of any measure required to protect the environment shall supersede any order of work designated within these Specifications. The Contractor shall meet the conditions as outlined in any and all permits

and requirements of the Federal, State, County, and City regulatory agencies.

The Contractor shall keep the disruption of the existing facility operations to a minimum. Water system shutdowns shall be limited to eight hours during any 24-hour period. The Contractor shall be responsible for all temporary pumping to include all connections, piping, pumping equipment, temporary electrical service and controls, and appurtenances.

Access to the existing operations areas shall be maintained. Disruption of this access shall be kept to a minimum and must be prearranged and scheduled through the Engineer with the Owner's operations and maintenance staff.

***** END OF SECTION *****

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes requirements that apply to all equipment and materials supplied on the Project.

The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the submittal. The Contractor shall verify that all features of all products conform to the requirements of the Contract Documents. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment that are being submitted for review. All extraneous materials shall be crossed out or otherwise obliterated. The Contractor shall ensure that there is no conflict with other submittals and notify the Engineer in each case where his submittal may affect the work of another contractor or the Owner. The Contractor shall ensure coordination of submittals among the related crafts and subcontractors and shall verify such coordination on all submittals.

Where noted in the Contract Documents, the structural, mechanical, and electrical designs associated with the indicated equipment items are specific to the manufacturer and model number specified. Any structural, mechanical, or electrical modifications required to utilize an approved substitution to the specified equipment shall be made by the Contractor at no additional cost to the Owner. Where approved substitutions of specified equipment affect other materials or equipment, mechanical, structural, or electrical work, the Contractor shall note in the equipment submittal any necessary changes to accommodate the substituted equipment. It shall also be the responsibility of the Contractor to coordinate other mechanical, structural, or electrical equipment submittals to make sure that all changes necessary to accommodate the substituted equipment are addressed in these submittals as well. See General Conditions 8.14.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01720	Record Drawings
01800	Testing, Commissioning, and Training

<u>Section</u>	<u>Item</u>
13250	Decommissioning Underground Storage Tanks
16050	Basic Electrical Materials and Methods

1.3 WORK INCLUDED

Submittals required for this work shall include any or all of the following as required by the particular specification section and the submittal schedule:

- A. Schedules and Plans
- B. PRODUCT SUBMITTALS
 - 1. Manufacturer's Literature
 - 2. Shop Drawings
 - 3. Color and Material Samples
 - 4. Design Calculations
 - 5. Test Reports
- C. Equipment Operation and Maintenance Manuals
- D. Post-Construction (Record) Drawings (see Section 01720)

1.4 SUBMITTAL INFORMATION

Shop, catalog, and other appropriate drawings and information shall be submitted to the Engineer for review prior to fabrication or ordering of all equipment and materials specified. The number of copies of submittal information to be submitted shall be as indicated below.

All submittal information shall be sent to the Engineer through the Contractor. The Contractor shall assign a separate submittal number to each item or group of items that relate to each specification section. Submittal numbers shall be assigned in consecutive ascending order, with the first project submittal assigned the number "1." Resubmittals shall be numbered using the same number followed by an alphabetical suffix. All submittals shall bear the Contractor's certification that he has reviewed, checked, and approved the submittal information prior to transmitting to the Engineer. The submittal number and related specification section shall be marked on each submittal.

PART 2 PRODUCTS

2.1 GENERAL

When the Contract Documents require a submittal the contractor shall submit the following number of documents.

Type of Submittal	Number of Copies
Final Equipment Manuals	4

The Contractor shall submit one copy of submittals electronically. Hard copies of final equipment manuals must be submitted.

2.2 PRODUCT SUBMITTALS

A. GENERAL

When indicated in the Contract Documents the contractor shall submit product data for review by the Engineer. Unless otherwise specified, within 14 calendar days after receipt of the submittal, the Engineer shall review the submittal and return three copies of the marked-up submittal. See Section 8.14 of the General Conditions.

B. MANUFACTURER'S LITERATURE

Where the contents of submitted literature include data not pertinent to the submittal, the portion(s) of the contents being submitted for the Engineer's review shall be clearly indicated.

C. SHOP DRAWINGS

Shop drawings shall be submitted in the form of blue-line or black-line prints of each sheet. Blueprint submittals will not be acceptable.

All shop drawings shall be accurately drawn to a scale sufficiently large enough to show pertinent features and method of connection or joining. On all shop drawings, figure dimensions shall be used as opposed to scaled dimensions.

D. COLOR AND MATERIAL SAMPLES

All material samples shall be of the exact article proposed to be furnished for the work and shall be submitted in the quantity

required. Samples shall be returned to the Contractor, with one retained by the Engineer.

Unless the precise color is specifically described in the Contract Documents, or whenever a choice of color or pattern is available in a specified product, accurate color charts shall be submitted to the Engineer for his review and selection.

E. DESIGN CALCULATIONS

Where required in the Specifications, design calculations shall be submitted to the Engineer. Design calculations shall be complete, concise, and in an easy-to-read format. All design calculations shall be stamped by a Professional Engineer licensed in the State of Washington.

F. TEST REPORTS

Copies of all test reports shall be submitted to the Engineer.

2.3 EQUIPMENT MANUALS

A. GENERAL

For all items of equipment, preliminary manufacturer's equipment operation and maintenance manuals shall be submitted to the Engineer for review. One copy will be returned to the Contractor with comments.

The following information shall be furnished for all items of equipment installed on the project requiring operational and/or maintenance procedures, and for any additional items indicated by the Engineer.

1. Lubrication Information

This shall consist of the manufacturer's recommendations regarding the lubricants to be used and the lubrication schedule to be followed.

2. Electrical and Control Diagrams

Diagrams shall show internal and connection wiring.

3. Startup Procedures

These instructions consist of equipment manufacturer's recommendations for installation, adjustment, calibration, and troubleshooting.

4. Operating Procedures

These instructions consist of the equipment manufacturer's recommended step-by-step procedures for starting, operating, and stopping the equipment under specified modes of operation.

5. Preventive Maintenance Procedures

These instructions consist of the equipment manufacturer's recommended steps and schedules for maintaining the equipment.

6. Overhaul Instructions

These instructions consist of the manufacturer's directions for the disassembly, repair, and reassembly of the equipment and any safety precautions that must be observed while performing the work.

7. Parts List

This list consists of the generic title and identification number of each component part of the equipment.

8. Spare Parts List

This list consists of the manufacturer's recommendations of number of parts, which should be stored by the Owner and any special storage precautions, which may be required.

9. Exploded View

Exploded or cut views of equipment shall be provided if available as a standard item of the manufacturer's information. When exploded or cut views are not available, plan and section views shall be provided with detailed callouts.

10. Test Documentation

Reports, records, data and forms documenting the results of equipment factory tests, including pump and blower performance curves, shall be provided, with the operating points for the specific equipment designated. When a special factory test of the supplied equipment is not performed, the manufacturer's standard performance reports and curves, with specified operating points, shall be provided for the supplied equipment.

11. Specific Information

Where items of information not included in the above list are required, they will be provided as described in the specifications for the equipment.

12. Warranty Information.

13. Maintenance Information Summaries (see below for requirements).

In addition, the following items of equipment shall be provided with Maintenance Information Summaries in each appropriate section of the equipment manuals, prepared according to the format specified herein:

- Diesel Generator
- Generator Fuel System

Maintenance information summaries shall be prepared on 8-1/2-inch x 11-inch paper only and shall contain the following information compiled from manufacturer's recommendations in the order shown.

1. Description or name of item of equipment.
2. Manufacturer.
3. Name, address, and telephone number of local manufacturer's representative.
4. Serial number (where applicable). The Contractor shall verify that it matches the equipment installed on the project.

5. Equipment nameplate data including model number.
6. Recommended maintenance procedures:
 - a. Description of procedures.
 - b. Maintenance frequency required.
 - c. Lubricant(s) or other materials required (where applicable), including type of lubricant, lubricant manufacturer, and specific compound.
 - d. Additional information as required for proper maintenance.
7. Recommended spare parts (where applicable).

The maintenance information summary shall be placed at the *beginning* of the manual.

All operation and maintenance information shall be comprehensive and detailed, and shall contain information adequately covering all normal operation and maintenance procedures.

For ease of identification, each manufacturer's brochure and manual shall be appropriately labeled with the equipment name and equipment specification number as it appears in the project Specifications. The information shall be organized in binders. The binders shall be provided with a table of contents and tab sheets to permit easy location of desired information.

Lubricants shall be described in detail, including type, recommended manufacturer, and manufacturer's specific compound to be used.

It shall be the responsibility of the Contractor to ensure that all operation and maintenance materials are obtained. Material submitted must meet the approval of the Engineer prior to project acceptance.

B. EXTRANEOUS DATA

Where the contents of the manuals include manufacturers' standard brochures or catalog pages, the exact item(s) used in this

installation shall be clearly indicated and all manufacturers' data which is extraneous shall be clearly deleted.

C. FINAL EQUIPMENT MANUALS

The Contractor shall be responsible for tracking and coordinating each separate manufacturer's equipment operation and maintenance manual submittal and shall resubmit, as necessary, until the Engineer's review indicates that the submittal is acceptable. The Contractor shall maintain equipment manual files until final approval copies are delivered to the Engineer. The Contractor shall be responsible for collating the approved operation and maintenance submittal sections into complete final manufacturers' equipment operation and maintenance manuals bound in post binders which are indexed to the Specifications. The Contractor shall deliver the complete final operation and maintenance manuals to the Engineer prior to project completion. All copies final manufacturers' equipment manuals submitted will be retained by the Engineer or Owner.

The Contractor shall also supply three CD-Rom copies of the final equipment manuals in a tabbed, searchable, .pdf format, with a table of contents bookmarked to provide a navigation link to each section of the manual.

PART 3 EXECUTION

3.1 IDENTIFICATION OF SUBMITTALS

A. GENERAL

Each submittal shall be accompanied by a letter of transmittal showing the date of transmittal, specification section, or drawing number to which the submittal pertains, submittal number, and a brief description of the material submitted.

B. RESUBMITTALS

When material is resubmitted for any reason, it shall be submitted under a new letter of transmittal and referenced to the previous submittal.

3.2 REVIEW OF SUBMITTALS

The Engineer will review all submittals for general conformance with the design and other requirements of the Contract Documents. Markings or comments shall not be construed as relieving the Contractor from compliance with the Contract Documents. Submittals may be rejected based on inadequate information and/or not meeting the requirements of the Contract Documents. Rejection of submittals requires action on the part of the Contractor to correct the reason for the rejection. The Contractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, and for techniques of assembly and installation.

3.3 COORDINATION OF PRODUCT SUBMITTALS

A. GENERAL

Prior to submittal for review by the Engineer, all data shall be fully coordinated, including the following:

1. All field dimensions and conditions.
2. All trades and public agencies involved, including necessary approvals.
3. All deviations from the Contract Documents.

B. GROUPING OF SUBMITTALS

1. All submittals shall be grouped with associated items, unless otherwise specifically permitted by the Engineer.
2. The Engineer may reject the submittals in their entirety or any part thereof, if not in accordance with the Contract Documents.

C. CERTIFICATION

Submittals shall bear the Contractor's certification that he has reviewed, checked, and approved the shop drawings prior to forwarding them to the Engineer.

3.4 TIMING OF PRODUCT SUBMITTALS

A. GENERAL

1. All submittals shall be made far enough in advance of installation to provide all required time for reviews and securing necessary approvals.
2. In scheduling, the Contractor shall allow for the time indicated in Part 2.2A for the Engineer's review following his receipt of the submittal.

B. DELAYS

No additional or separate payment will be made for costs of delays occasioned by tardiness of submittals on the part of the Contractor.

3.5 EQUIPMENT MANUALS

The preliminary copies of the manufacturer's equipment manuals shall be delivered to the Engineer for review not later than the time of equipment delivery to the project site. The Contractor will not be paid for more than 90 percent of the purchase value of an item of equipment until the Engineer has received the preliminary equipment manual for that item of equipment.

Final copies of the manufacturer's equipment manuals shall be delivered to the Engineer at least 14 calendar days prior to requesting payment in excess of 90 percent completion for the project. Progress payments for work in excess of 90 percent completion will not be made until the final equipment manuals have been received and accepted by the Engineer. Prior to submittal of the final equipment manuals, the Contractor shall check the manuals for accuracy and completeness and shall verify that prior review comments have been addressed.

Unless otherwise allowed by the Engineer or Owner, Maintenance Information Summaries shall be submitted on the form provided at the end of this Section.

***** END OF SECTION *****

MAINTENANCE SUMMARY FORM

PROJECT NAME: _____
CONTRACT EXECUTION DATE: _____
SPECIFICATION SECTION: _____

ORDER NUMBER: _____

EQUIPMENT ITEM: _____
TAG NUMBER(S): _____

MANUFACTURER: _____
MAKE: _____
MODEL: _____

SERIAL NUMBER(S): _____

MOTOR NAMEPLATE DATA: _____
(HP, PHASE, VOLTAGE, RPM, HZ) _____

LOCAL REPRESENTATIVE NAME: _____
ADDRESS: _____
PHONE: _____
EMAIL: _____

MAINTENANCE REQUIREMENTS

Maintenance Operation (Summary)	Frequency	Lubricant (If Applicable)

SECTION 01310

PROJECT MEETINGS

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes information pertaining to the various meetings that will be held during the course of constructing this project.

1.2 PRECONSTRUCTION CONFERENCE

See Section 8.10 of the General Conditions.

1.3 PROJECT PROGRESS MEETINGS

The Owner and the Engineer will schedule and attend regular weekly meetings with the Contractor for coordination, administrative, and procedural requirements of the project. Meetings will be held at the project location in Lake Forest Park, Washington, or at the Northshore Utility District Headquarters in Kenmore, Washington.

1.4 CONSTRUCTION MEETINGS

The Contractor shall schedule and hold regular meetings during the project:

- A. Safety Meetings (Contractor's subcontractors shall attend if they are working onsite.)
- B. Project Progress Meetings
- C. Equipment Installation Meetings
- D. Coordination Meetings
- E. Startup and Testing Meetings

The Contractor shall notify the Owner and Engineer in advance of all meetings. The meetings may or may not be attended by the Owner and Engineer.

***** END OF SECTION *****

SECTION 01385

DOCUMENTATION OF EXISTING CONDITIONS

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the video recording requirements for the project.

The Contractor shall provide the Engineer with a DVD or other computer-readable digital format of the project area prior to and upon completion of all construction. The video recording shall utilize equipment that will visually document an accurate audio-visual description of the existing and post-construction conditions.

The Contractor shall notify the Engineer prior to the recording to allow the Engineer to witness the video recording. The Contractor shall provide preconstruction video recording of the existing conditions for the entire project site.

Upon completion of the work, the Contractor shall provide video recording in the same manner and vantage point as the preconstruction video recordings. The intent of this Specification section is to provide a comparison between existing and post-construction conditions.

The rate of speed the documentation will be video recorded at, the panning rates, and the zoom-in/zoom-out rates will be controlled so that playback will produce a clear television picture of the areas video recorded.

The video recording shall be accomplished during a period of good visibility. Unless otherwise directed by the Engineer, video recording will not be allowed during times of precipitation or poor visibility.

When available light is not sufficient to produce a clear television image, additional lighting shall be supplied by the photographer to ensure good picture quality. The camera crew shall be able to work independent of any power source, utilizing battery power to operate the camera, and lighting.

A legible reader board shall be provided by the photographer to visually document the date, job title, and site identification. The audio portion of the video recording will be used for identification purposes, addresses, and any other audio required or as directed by the Engineer.

***** END OF SECTION *****

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the control tests, test sample collection, required field-testing, and special inspections as specified herein, and indicated on the Plans.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
02300	Earthwork
02700	Gravel Materials
02710	Gravel Surfacing
02740	Hot Mix Asphalt

1.3 PAYMENT

All testing as required by this Section shall be coordinated and scheduled by the Contractor with the Owner's designated testing agency. The Owner will contract with, and pay for, a testing agency to conduct all field and laboratory tests and special inspections as designated herein.

Retesting and reinspection required because of defective work and testing performed for the convenience of the Contractor shall also be paid for by the Contractor. Costs for retesting (beyond that which is required herein) will be reimbursed to the Owner in the form of a credit on a change order at the time of project acceptance.

All costs for scheduling, sampling, coordinating, and retesting of defective work shall be considered as incidental to the work and merged into the respective unit and lump sum prices bid.

PART 2 PRODUCTS

2.1 AGGREGATES

All aggregates shall be tested in accordance with applicable WSDOT test methods:

<u>Title</u>	<u>Test Method</u>
Sampling	AASHTO T2
Sieve Analysis of Fine and Coarse Aggregates	104A
Material Finer than No. 200 Sieve in Aggregates	102A
Percentage of Particles Smaller than 0.025 mm and 0.005 mm	603A
Organic Impurities	111A
Abrasion of Coarse Aggregates by Use of the Los Angeles Machine	101A
Sand Equivalent	109A

2.2 CAST-IN-PLACE CONCRETE

Cast-in-place concrete shall be tested in accordance with applicable parts of Chapter 16 of ACI 301. Concrete reinforcement and concrete special inspections shall be performed in accordance with local Building Official and WABO requirements.

2.3 HOT MIX ASPHALT

Paving asphalt shall be tested in accordance with the following Washington State Department of Transportation test methods:

<u>Characteristics</u>	<u>Test Method</u>
Tests on Residue from RTFC Procedure	208
Absolute Viscosity at 140 degrees F, poise	203
Kinematic Viscosity at 275 degrees F, cSt, min.	202
Penetration at 77 degrees F, 100 g/5 sec., min. ⁽¹⁾	201
Percent of Original Penetration at 77 degrees F, min.	2
Ductility at 45 degrees F, cm, min.	
Flashpoint, (Cleveland Open Cup), degrees F min. (test on original asphalt)	206

Solubility in Trichloroethylene percent, min. (test on original asphalt) 214

(1) Original penetration, as well as penetration after RTFC loss shall be determined by AASHTO Test Method T 49.

A. COMPLETE EXTRACTIVE OF UNCOMPACTED MIX

Test methods shall be in accordance with the following:

1. AASHTO T68
2. ASTM D2172
3. AASHTO T30

PART 3 EXECUTION

3.1 SAMPLING AND TESTING FREQUENCY

A. CONCRETE TESTING

All testing shall conform to applicable portions of ACI. Special inspections of concrete and concrete reinforcement shall comply with WABO requirements.

All concrete must meet the specified requirements for minimum 28-day compressive strength.

All concrete cylinders shall be molded and tested for strength by an Owner-employed testing laboratory scheduled and coordinated by the Contractor.

The Contractor shall furnish all concrete required for molding of the cylinders. In cases where cylinders are stored at the project site, the Contractor shall provide storage and protection for the cylinders in accordance with ACI requirements.

Concrete tests and testing frequency shall be in accordance with the more stringent of the testing requirements specified in Section 03300-3.17 of these Specifications, and the following table:

<u>Material</u>	<u>Test</u>	<u>Minimum Sampling & Testing Frequency</u>
Coarse Aggregate (for each grading size) ¹	Gradation	One test every 500 cy of concrete.

<u>Material</u>	<u>Test</u>	<u>Minimum Sampling & Testing Frequency</u>
	Deleterious Substances	One test initially and thereafter when appearance makes the material suspect.
	L.A. Abrasion	One every 2,000 tons of aggregate.
	Moisture specific gravity and absorption ¹	One initially and every 250 cy thereafter. One moisture to be conducted prior to any batching and more frequently if hauling and storage does not provide a consistent moisture content.
Fine Aggregate ¹	Gradation and fineness modules	One every 250 cy of concrete.
	Deleterious Substances	(same as coarse aggregate).
	Moisture, specific gravity and absorption ¹	(same as coarse aggregate).
Concrete	Slump	Conduct one test every day of placement and one additional test for every 50 cy placed and more frequently if batching appears inconsistent. Conduct in conjunction with taking concrete cylinders.
	Entrained Air Ambient and concrete temperatures	Conduct with each slump test. Conduct with each slump test.

<u>Material</u>	<u>Test</u>	<u>Minimum Sampling & Testing Frequency</u>
Concrete	Compressive strength and evaluation of results per ACI 214. (includes unit weight of each cylinder)	For all concrete placement, take one set of four cylinders per day and one additional set of cylinders for every 50 cy of each class of structural concrete. Cylinders shall be 4 inch by 8 inch. Test one cylinder at 7 days and two at 28 days. Fourth cylinder shall be held in reserve. A plot and statistical evaluation shall be maintained in accordance with ACI 214 for compressive strength results. Field cure cylinders shall be made when insitu strengths are required to be known.

1. Aggregate moisture tests are to be conducted in conjunction with concrete strength tests for water/cement (w/c) calculations.

B. SPECIAL INSPECTIONS

Contractor shall coordinate and schedule all required Special Inspections per WABO requirements (Chapter 17 of the IBC) with the Owner designated testing agency. Special inspections include cast-in-place concrete, concrete reinforcement, structural welded connections, bolted connections, concrete masonry units (CMU), compaction testing for building and structure foundations, and epoxy adhesive bolting.

***** END OF SECTION *****

SECTION 01500

TEMPORARY & STORAGE FACILITIES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the temporary facilities required for this project, but not necessarily limited to:

- A. Temporary utilities such as water, off-site staging, and off-site parking.
- B. Sanitary facilities.
- C. Temporary enclosures such as fences, tarpaulins, barricades, and canopies.

PART 2 PRODUCTS

2.1 UTILITIES

The Contractor shall be responsible for providing water necessary for construction. This includes costs for supplying potable water for hydrostatic pressure leak testing of all water-holding structures and operational testing of all equipment and processes. Water is available from the Owner free of charge, provided that it is used responsibly. The Contractor shall install a hydrant meter with DCVA prior to obtaining water from the Owner. The hydrant meter with DCVA shall be obtained from the Owner.

2.2 SANITARY FACILITIES

The Contractor shall provide toilet and wash-up facilities for their workforce at the site of work. They shall comply with applicable laws, ordinances, and regulations pertaining to the public health and sanitation of dwellings and camps.

2.3 OFF-SITE STAGING AND PARKING

The Contractor shall note that space is limited throughout the construction site. Employees of the Contractor, all subcontractors, vendors, suppliers, and associated personnel shall not be allowed to park onsite during the course of construction. It shall be the responsibility of the Contractor to

provide sufficient parking facilities in authorized area(s) other than the construction site for the above-mentioned personnel.

The Contractor shall not be allowed to stockpile and store equipment and materials throughout the construction site. The Contractor shall coordinate their schedule so that all equipment and materials shall be brought to the construction site only when they are to be installed/utilized.

The Contractor shall provide storage of equipment and materials at an offsite, bonded warehouse, to be approved by the Engineer. The Contractor shall pay all costs associated with off-site delivery, storage, and transfer to the construction site.

2.4 ENCLOSURES

The Contractor shall furnish, install, and maintain during the project all required scaffolds, tarpaulins, barricades, canopies, warning signs, steps, bridges, platforms, and other temporary construction necessary for proper completion of the work in compliance with all pertinent safety and other regulations.

2.5 STORAGE SHEDS

The Contractor shall provide storage for the protection of equipment, materials, supplies, and tools and shall ensure that a building be used for the storage of materials that deteriorate when exposed to moisture. Workshops and storage buildings shall be located in the general area of the work and shall be clean and in proper order. Storage of materials at the project sites shall not obstruct access or use by the Owner's employees of existing facilities.

PART 3 EXECUTION

All temporary facilities and controls shall be maintained as long as required for the safe and proper completion of the work. The Contractor shall remove such temporary facilities and controls as rapidly as progress of the work will permit or as directed by the Owner.

***** END OF SECTION *****

SECTION 01720

RECORD DRAWINGS

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the record drawings, which shall be maintained and annotated by the Contractor during construction.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals

1.3 INFORMATION PROVIDED BY THE OWNER

The Contractor will be provided with the following items to maintain record drawings for the project:

- A. One full size (22" x 34") paper set of Plans.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall maintain the following record drawings for the project:

- A. A neat and legibly marked set of Contract Plans showing the final location of piping, equipment, electrical conduits, outlet boxes and cables;
- B. Additional documents such as schedules, lists, drawings, and electrical and instrumentation diagrams included in the Contract Documents; and
- C. Contractor layout and installation drawings.

Unless otherwise specified, record drawings shall be full size and maintained in a clean, dry, and legible condition. Record documents shall

not be used for construction purposes and shall be available for review by the Engineer during normal working hours at the Contractor's field office. At the completion of the work, prior to final payment, all record drawings shall be submitted to the Engineer.

Marking of the drawings shall be kept current and shall be done at the time the material and equipment are installed. Annotations to the record documents shall be made with an erasable colored pencil conforming to the following color code:

- A. Additions - Red
- B. Deletions - Green
- C. Comments - Blue
- D. Dimensions - Graphite

Legibly mark drawings to record actual depths, horizontal and vertical location of underground raceways, cables, and appurtenances referenced to permanent surface improvements.

The Contractor's record drawings (full-size hard-copy) will be reviewed regularly for completeness by the Engineer prior to preparing the progress estimate for payment. If the record drawings do not reflect the work performed, payment for that item of work will not be included in the progress estimate.

***** END OF SECTION *****

SECTION 01800

TESTING, COMMISSIONING, AND TRAINING

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the installation, testing, and training for all mechanical, electrical, and instrumentation systems and completed portions of the work.

See also Section 16050 for additional electrical and instrumentation system testing requirements.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01110	Scope of Work
01300	Submittals
01400	Quality Control
01500	Temporary Facilities
15050	Piping Systems
15400	Plumbing
15150	Diesel Generator Fuel System
16050	Basic Electrical Materials and Methods
16230	Generator Assemblies

1.3 QUALITY ASSURANCE

A. INSTALLATION

All mechanical, electrical, and instrumentation equipment provided under this Contract shall be installed in conformity with the Contract Documents, including the manufacturer's requirements. Should a manufacturer's installation recommendation conflict with specific requirements of this Contract Document, the Contractor shall bring the matter to the attention of the Engineer. Any additional costs arising out of changes authorized by the Engineer to accommodate manufacturer's installation recommendations will be considered extra work. Any costs incurred by the Contractor through failure to timely notify the Engineer of a difference between Contract Document and manufacturer's installation requirements shall be borne by the Contractor.

B. TESTING

1. General Requirements

All equipment and partially complete or fully completed portions of the work included in this Contract shall be tested and inspected to prove compliance with the Contract requirements. Unless otherwise specified, all costs of testing, including temporary facilities and connections, shall be borne by the Contractor. For the purpose of this Section, equipment shall mean any mechanical, electrical, instrumentation, or other device with one or more moving parts or devices requiring an electrical, pneumatic, or hydraulic connection. Installed leakage tests and other piping tests shall be as specified in Sections 15050 and 15400. Installed tests for electrical and instrumentation devices and systems shall be in accordance with Division 16.

No tests specified herein shall be applied until the item to be tested has been inspected and approval given for the application of such test.

Tests and inspection shall include:

- a. The delivery acceptance test and inspections.
- b. The installed tests and inspections. These tests may be performed with water or the process fluid, as described in the accepted test plan.
- c. The operational testing of completed sections of the facility. These tests may be performed with water or the process fluid, as described in the accepted test plan.

Tests and inspections, unless otherwise specified or accepted, shall be in accordance with the recognized standards of the industry. The Contractor shall see that scheduling and performance of all tests are coordinated with involved subcontractors and suppliers. The Contractor shall allow for up to two additional setpoint changes during testing. No extra costs or time allowances shall be provided as long as this setpoint allowance is not exceeded.

The form of evidence of satisfactory fulfillment of delivery acceptance test and inspection requirements shall be, at the discretion of the Engineer, either by tests and inspections carried out in their presence or by certificates or reports of tests and inspections carried out by approved persons or organizations. The Contractor shall provide and use forms that include all test information, including specified operational parameters. The content of the forms used shall be acceptable to the Engineer.

A master test log book shall be maintained by the Contractor, which shall cover all tests including piping, equipment, electrical, and instrumentation. The master test log book shall be provided with loose-leaf pages that shall be copied weekly after updating for transmittal to the Engineer. The master test log book shall be transmitted to the Engineer upon completion of the project.

2. Delivery Acceptance Tests and Inspections

The delivery acceptance tests and inspections shall be at the Contractor's expense for any equipment specified herein and shall include the following:

- a. Test of items at the place of manufacture during and/or on completion of manufacture, comprising, electric and instrumentation subsystems tests, performance and operating tests and inspections in accordance with the relevant standards of the industry and more particularly as detailed in individual clauses of these Specifications to satisfy the Engineer that the items tested and inspected comply with the requirements of this Contract. Tests other than those specified shall be in accordance with Section 01400.
- b. Inspection of all items delivered at the site or to any authorized place of storage so that the Engineer may be satisfied that such items are of the specified quality and workmanship and are in good order and condition at the time of delivery. The Contractor shall be prepared to remove all coverings, containers, or crates to permit the Engineer to conduct his inspection. Should the Engineer find, in his opinion, indication of damage or deficient quality of workmanship, the Contractor shall provide the

necessary documentation or conduct such tests deemed necessary by the Engineer to demonstrate compliance.

3. Installed Tests and Inspections

a. General

All equipment shall be tested by the Contractor to the satisfaction of the Engineer before any facility is put into operation. Tests shall be as specified herein and shall be made to determine whether the equipment has been properly assembled, aligned, adjusted and connected. Any changes, adjustments, or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the work.

b. Procedures

i. General

The procedures shall be divided into two distinct stages; preoperation checkout and system testing. Testing procedures shall be designed to duplicate, as nearly as possible, all conditions of operation and shall be carefully selected to ensure that the equipment is not damaged. Once the testing procedures have been reviewed and approved by the Engineer, the Contractor shall produce checkout, alignment, adjustment and calibration sign-off forms for each item of equipment to be used in the field by the Contractor and the Engineer jointly to ensure that each item of electrical, mechanical and instrumentation equipment has been properly installed and tested. The Contractor is advised that failure to observe these precautions may place the acceptability of the subject equipment in question.

ii. Preoperation Checkout

The installed tests and inspection procedures shall incorporate all requirements of these Specifications and shall proceed in a logical, step-wise sequence to ensure that all equipment has been properly serviced, aligned, connected, calibrated, and adjusted prior to operation. Preoperation checkout procedures shall include, but not necessarily be limited to:

- (1) Electrical system testing as specified in Division 16.
- (2) Alignment of equipment.
- (3) Preoperation lubrication.

iii. System Test

Once all affected equipment has been subjected to the required preoperational checkout procedures and the Engineer has witnessed and has not found deficiencies in that portion of the work, individual systems may be started and operated under simulated operating conditions to determine as nearly as possible whether the equipment and systems meet the requirements of these Specifications. The equipment shall be operated a sufficient period of time to determine machine operating characteristics, including temperatures and vibration, to observe performance characteristics, including performance throughout the specified range, and to permit initial adjustment of operating controls.

If under test, any portion of the work should fail to fulfill the Contract requirements and is adjusted, altered, renewed or replaced, tests on that portion when so adjusted, altered, removed or replaced, together with all other portions of the work as are affected thereby, shall, if so required by the Engineer, be

repeated within reasonable time and in accordance with the specified conditions. The Contractor shall pay to the Owner all reasonable expenses incurred by the Owner as a result of repeating such tests.

All equipment shall be checked for loose connections, unusual movement, excessive temperature, noise, and/or vibration or other indications of improper operating characteristics. Any deficiencies shall be corrected to the satisfaction of the Engineer. All machines or devices, which exhibit unusual or unacceptable operating characteristics shall be disassembled and inspected. They shall then be repaired or removed from the site and replaced at no cost to the Owner.

Test results shall be within the tolerances set forth in the detailed Specification sections of the Contract Documents. If no tolerances have been specified, test results shall conform to tolerances established by recognized industry practice. Where, in the case of an otherwise satisfactory installed test, any doubt, dispute, or difference should arise between the Engineer, and the Contractor regarding the test results or the methods or equipment used in the performance of such test, then, the Engineer may order the test to be repeated. If the repeat test, using such modified methods or equipment as the Engineer may require, substantially confirms the previous test, then all costs in connection with the repeat test will be paid by the Owner otherwise the costs shall be borne by the Contractor. Where the results of any installed test fail to comply with the Contract requirements for such test, then such repeat tests as may be necessary to achieve the Contract requirements shall be conducted by the Contractor at his expense.

4. Operational Testing

After completion of all installed testing and review by the Engineer that all equipment complies with the requirements of the Specifications, the Contractor shall conduct operational testing. All domestic water, oil, fuel, and chemical systems shall be filled with the specified fluid.

The Contractor shall operate the completed facility for a period of not less than that specified in Part 3.4 of this Section during which all systems shall be operated as a complete facility at various loading conditions, as directed by the Engineer. Should the operational testing period be halted for any reason related to the facilities constructed or the equipment furnished under this Contract, or the Contractor's temporary testing systems, the operational testing program shall be repeated until the specified continuous period has been accomplished without interruption. All process units shall be brought to full operating conditions, including temperature, pressure, and flow.

Record drawings of facilities involved must be accepted and ready for turnover to the Owner at the time of operational testing.

All costs for water, fuel, and power required during operational testing shall be borne by the Owner.

Final O&M manuals for the facilities must be accepted and ready for turnover to the Owner at the conclusion of operational testing.

C. TRAINING

During the equipment testing, the Contractor shall make available experienced factory-trained representatives of the manufacturers of all the various pieces of equipment, to train the Owner's personnel in the operation and maintenance thereof. The time required for this training shall be as covered in the specifications for the specific piece of equipment. The Contractor shall notify the Engineer of the time of the training at least 10 days prior to the start time of the training.

1.4 SUBMITTALS

A. STARTUP AND TESTING PLAN

Prior to receipt of any progress payments in excess of 60 percent of the Contractor's total bid for the work, the Contractor shall submit to the Engineer five copies of a startup and testing plan with details of the installed tests and inspection procedures he proposes to adopt for testing and startup of all equipment to be operated singly and together.

B. TRAINING OUTLINE

The Contractor shall submit five copies of a detailed outline of training activities to be performed by each manufacturer's representative 10 days prior to the start time of the training. This outline shall indicate how the manufacturer's representative is going to allocate the required specified number of training hours to fulfill these contractual obligations.

PART 2 PRODUCTS

2.1 INSTALLATION

Materials employed in the installation shall conform to the requirements of the Contract Documents and the recommendations of the equipment manufacturers.

2.2 TESTING

A. RECORDS

The Contractor shall provide sign-off forms for all installed and operational testing to be accomplished under this Contract. Sign-off forms shall be provided for each item of mechanical, electrical and instrumentation equipment provided or installed under this Contract and shall contain provisions for recording relevant performance data for original testing and not less than three retests. Separate sections shall be provided to record values for the preoperation checkout, as well as signatures of representatives of the equipment manufacturers, the Contractor, and the Engineer.

PART 3 EXECUTION

3.1 INSTALLATION

All equipment and apparatus used in testing shall be installed by specialists properly skilled in the trades and professions required to assure first-class workmanship. Where required by detailed Specifications, the Contractor shall cause the installation of specific equipment testing items to be accomplished under the supervision of factory-trained installation specialists furnished by the equipment manufacturers. The Contractor shall be prepared to document the skills and training of all workmen engaged in the installation of all testing equipment furnished either by the Contractor or the Owner.

3.2 TESTING

Testing shall proceed on a step-by-step basis in accordance with the Contractor's written testing procedures. The Contractor's testing work shall be accomplished by a skilled team of specialists under the direction of a coordinator whose sole responsibility shall be the orderly, systematic testing of all equipment, systems, structures, and the complete facility as a unit. Each individual step in the procedures shall be witnessed by a representative of the Engineer.

During the facility operational testing period, all equipment and systems in operation shall be operated to the greatest extent practicable, at conditions, which represent the full range of operating parameters as defined by the Contract Documents.

3.3 TRAINING

Training of the Owner's personnel shall be done by experienced technical manufacturers' representatives. Training shall be provided during a scheduled, dedicated session and shall not be combined with other field services such as equipment testing, startup and check-out. When required by these specifications, the training sessions shall be video and audio-taped by the Contractor and the final DVD delivered to the Owner. These manufacturers' representatives shall follow the outline presented here:

GENERAL OUTLINE FOR MANUFACTURER PRESENTATIONS

A. FAMILIARIZATION

1. Overview explaining theory of operation.

2. Show catalog, parts lists, drawings, etc., in the shop drawings and O&M manuals. Clearly identify the model or identification number of the equipment for which training is being provided.
3. Check out the installation of the specific equipment items.
4. Demonstrate the unit and show that all parts of the Specifications are met.
5. Answer questions.

B. SAFETY

1. Point out safety references.
2. Discuss proper precautions around equipment.

C. OPERATION

1. Point out reference literature.
2. Explain all modes of operation – including emergency.
3. Check out Owner's personnel on proper use of the equipment.

D. PREVENTIVE MAINTENANCE (PM)

1. Pass out PM list including reference material, as well as daily, weekly, monthly, quarterly, semi-annual, and annual jobs.
2. Show how to perform PM jobs.
3. Show Owner's personnel what to look for as indicators of equipment problems.

E. CORRECTIVE MAINTENANCE

1. List possible problems.
2. Discuss repairs - point out special problems.

3. Open up equipment and demonstrate procedures, where practical.

F. PARTS

1. Show how to use parts list and order parts.
2. Check over spare parts on hand. Make recommendations.

G. LOCAL REPRESENTATIVES

1. Where to order parts: Name, address, telephone, fax, e-mail.
2. Service problems:
 - a. Who to call.
 - b. How to get emergency help.

3.4 FACILITY OPERATIONAL TESTING

The systems described below shall be tested to demonstrate the performance of mechanical, electrical, instrumentation and control subsystems together as an integrated system. Where the testing described in this Section conflicts with the testing requirements specified for individual equipment, or the manufacturer's recommended testing procedure, those requirements and procedures shall prevail. Facility operational testing shall be sequenced in coordination with the work sequence specified in Section 01110. Temporary facilities necessary for operational testing are specified in Paragraph 2.2 of this Section and in Section 01500.

***** END OF SECTION *****

SECTION 01900

SALVAGE AND DEMOLITION

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section covers the demolition of existing structures, piping, equipment, and sitework, and the salvage of existing materials and equipment as indicated on the Plans and as specified herein.

All areas and facilities of the existing facility, which are not to be removed, must remain in continuous operation during the work. Demolition and salvage work shall create a minimum of interference with the operation of the facility.

The Plans show the major items to be demolished and removed. The Contractor shall, however, remove any other incidental above-grade items, which are not to be used in the completed project.

1.2 SALVAGE

Salvageable equipment and material shall be removed with care so as not to impair future uses and shall include all equipment and material so indicated on the Plans. Salvaged equipment and material not reused or rejected by the Owner shall be cleaned and protected from corrosion and weather and delivered by the Contractor to the Owner at the District Headquarters in Kenmore, Washington.

Reuse of salvageable equipment and material by the Contractor will not be permitted except where specifically indicated on the Plans and Specifications or where approved by the Engineer and Owner. Salvageable equipment and materials rejected in writing by the Owner shall become the property of the Contractor and be disposed of away from the site without additional cost to the Owner.

All salvageable equipment and materials associated with the existing diesel generator and electrical system shall become the property of the Contractor upon removal. This equipment can then be sold by the Contractor to any interested party.

1.3 DEMOLITION

The Contractor shall be responsible for compliance with current City, County, State, and Federal codes and regulations related to demolition.

The Contractor shall notify all affected utilities and comply with their respective requirements for abandonment of such utilities including power, telephone, natural gas, water, sanitary sewer, and storm sewer utilities.

The Contractor shall maintain access for the Owner's employees during the demolition period and provide barricades, fences, etc., as required for job site safety.

Demolition of concrete, masonry, roofing, asphalt, and other materials shall be done so as to avoid damage to existing structures intended to remain. Demolition or cutting required to add to or modify existing structures shall be done in such a manner that the appearance and utility of the existing structure is not impaired and so that a neat transition from new to old material may occur.

All piping and appurtenances located less than 4 feet below finished grade shall be removed and hauled to an approved disposal site. All piping and appurtenances located four feet or more below finished grade may be abandoned in place, unless shown otherwise on the Plans, as long as Contractor fully seals all pipe and appurtenance openings with grout.

All waste materials from demolition or cutting shall become the property of the Contractor and shall be removed from the site and hauled to an approved waste disposal site, if declared surplus by the Owner. All materials and equipment, however, are property of the Owner unless declared surplus. Some equipment and materials scheduled for salvage and delivery to the Owner are noted on the Plans.

1.4 HAZARDOUS MATERIALS

The existing diesel generator contains the following hazardous materials:

- Diesel fuel,
- Engine coolant,
- Engine oil, and
- Lead acid batteries.

Special consideration shall be taken to accommodate these materials and their disposal. Disposal of all of these materials shall be in accordance

with all local, state, and Federal requirements for disposal of hazardous materials.

Special care shall be exercised when proceeding with demolition, removal, and wastehauling of the existing generator to avoid spills or contamination of the surrounding environment. Any and all spills or unauthorized disposal of hazardous materials shall be immediately remedied by the Contractor, at their sole expense.

A. HAZARDOUS MATERIAL TRANSPORT AND DISPOSAL

The Contractor, and their selected subcontractors, shall comply with all federal, state, and local regulations regarding the collection, containment and transportation of hazardous materials, including but not limited to WAC 173-303 Dangerous Waste Regulation. The Contractor shall assume the responsibility for ensuring compliance with these regulations.

***** END OF SECTION *****

DIVISION 2

SITework

SECTION 02050

LOCATE EXISTING UTILITIES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the anticipated conflicts, which may exist with existing utilities. A reasonable attempt has been made to locate the existing utilities; however, the exact location, and/or depth are unknown in most instances. Locations and dimensions shown in the Plans for existing facilities are in accordance with available information obtained without uncovering, measuring, or other verification. It shall be the responsibility of the Contractor to locate existing utilities and their depth.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
02300	Earthwork

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall determine the difficulties to be encountered in constructing the Project and his locate effort based upon the information provided on the Plans, field investigation, and the Contractor's contacts with the existing utility companies. The Contractor shall determine the extent of exploration required to first prevent damage to those existing utilities, and secondly to determine if the proposed improvements are in conflict with existing utilities.

The Contractor shall locate existing utilities sufficiently ahead of construction so that the Engineer can modify the alignment, or grade prior to construction. Where the alignment of the proposed utility cannot be adjusted to miss the existing utility without installation of additional pipe or fittings, the Contractor may be entitled to additional compensation to reroute the proposed utility.

The Contractor shall call the Utility Location Request Center (One Call Center), for field location, not less than 2 nor more than 10 business days before the scheduled date for commencement of excavation that may affect underground utility facilities, unless otherwise agreed upon by the parties involved. A business day is defined as any day other than Saturday, Sunday, or a legal local, State, or Federal holiday. The telephone number for the One Call Center for this project is (800) 424-5555. If no one-number locator service is available, notice shall be provided individually to those owners known to or suspected of having underground facilities within the area of the proposed excavation.

The Contractor is alerted to the existence of Chapter 19.122 RCW, a law relating to underground utilities. Any cost to the Contractor incurred as a result of this law shall be at the Contractor's expense.

No excavation shall begin until all know facilities in the vicinity of the excavation area have been located and marked.

***** END OF SECTION *****

SECTION 02250

TEMPORARY SHORING AND BRACING

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the temporary shoring and bracing for excavations including the trench excavation safety systems as shown on the Plans and as specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
02300	Earthwork
02530	Utility Structures
02534	Storm Sewers

1.3 WORK INCLUDED

The extent of temporary shoring and bracing work includes, but is not limited to:

- A. Temporary shoring and bracing necessary to protect the following against loss of ground or caving embankments: existing structures, buildings, roads, walkways, utilities, electrical transmission towers and support wiring, other facilities and improvements where required to comply with codes and authorities having jurisdiction.
- B. Trench excavation safety systems, pursuant to RCW Chapter 49.17 and WAC 296-155-655.
- C. Maintenance of shoring and bracing.

1.4 SUBMITTALS

The Contractor shall submit shoring and bracing layout and design drawings, calculations and other backup data to the Owner for review in accordance with Section 01300 prior to the start of construction.

1.5 EXISTING UTILITIES

The Contractor shall protect existing active sewer, water, gas, electrical, and other utility services and structures that may be present. This shall also include all pipelines, services, and structures that are the property of the Owner.

PART 2 PRODUCTS

The Contractor shall provide suitable shoring and bracing materials, which shall support loads imposed. Materials for shoring systems need not be new, but shall be in serviceable conditions.

PART 3 EXCAVATION

3.1 VERIFICATION OF CONDITIONS

The Contractor shall notify the Owner immediately if, during construction, subsurface conditions are different from those encountered in the exploratory holes.

3.2 INSTALLATION AND APPLICATION

The Contractor shall provide shoring systems adequately anchored and braced to resist earth and hydrostatic pressures at locations as needed to support excavations during construction. The Contractor shall locate required bracing to clear all permanent work. Bracing which must be relocated shall be installed prior to the removal of original bracing. The Contractor shall not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to the Owner. The Contractor shall maintain bracing until structural elements are rebraced by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.3 REMOVAL

The Contractor shall remove shoring and bracing in stages to avoid disturbances to adjacent and underlying soils and damage to structures, pavements, facilities and utilities. The Contractor shall repair or replace, as acceptable to the Owner, adjacent work damaged or displaced through the installation or removal of shoring and bracing work.

3.4 EXCAVATION SAFETY SYSTEMS

All work shall be carried out with due regard for public safety. Open trenches shall have proper barricades and at night they shall be distinctly indicated by adequately placed lights, as provided for elsewhere in the Specifications.

The Contractor is reminded that the Owner has not so delegated, and the Owner's Representative does not purport to be a trench or excavation system safety expert, is not so engaged in that capacity under this Contract, and has neither the authority nor the responsibility to enforce construction, safety laws, rules, regulations, or procedures or to order the stoppage of work for claimed violations of trench or excavation safety.

The furnishing by the Owner of resident representation and inspection personnel shall not make the Owner responsible for the enforcement of such laws, rules, regulations, or procedures, nor shall such make the Owner responsible for construction means, methods, techniques, sequences, procedures, or for the Contractor's failure to properly perform the work necessary for proper trench and excavation safety.

***** END OF SECTION *****

SECTION 02300

EARTHWORK

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the earthwork, including trench excavation and backfill for piping, excavation and backfill for structures, and finish grading.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
01500	Temporary Facilities
02250	Temporary Shoring and Bracing
02370	Erosion Control
02700	Gravel Materials

PART 2 PRODUCTS

2.1 GRAVEL MATERIALS

All gravel materials shall conform to Section 02700.

PART 3 EXECUTION

3.1 PREPARATION

Excavation may commence once all erosion control measures are in place in accordance with the Plans and Section 02370 and to the satisfaction of the Owner.

3.2 GENERAL REQUIREMENTS

Excavation, compaction and backfill for structures, pipelines and the final site contours shall be formed by either excavating or compacting fill, as required, to provide the cross-sections as shown on the Plans.

All excavation performed on this Project shall be considered unclassified. Excavation shall consist of the removal of any and all material encountered, including debris, rubble, concrete, metal, topsoil, cutting and

removal of existing surfacing, tree stumps, trees, logs, abandoned rail ties, abandoned piping, piling, riprap, etc.

Excavations shall be kept free of water, both surface water and groundwater, during the excavation, installation of pipelines and structures, and the placement of backfill.

The Contractor's attention is also called to the depth of the structures and piping; for this reason, special shoring and bracing may be required. All shoring and bracing or sheeting required to perform and protect the excavation and to safeguard the employees, shall be furnished by the Contractor.

No timber bracing, lagging, sheathing or other lumber shall be left in any excavation except with permission of the Engineer and in the event such permission is granted, no separate payment shall be allowed for burying such material.

All stockpiles shall be covered with plastic and no stockpile shall be higher than 6 feet above existing grade.

3.3 PROTECTION OF FOUNDATION SURFACES

Care shall be taken to preserve the foundation surfaces shown on the Plans in an undisturbed condition. If the Contractor unnecessarily over excavates or disturbs the foundation surfaces shown on the Plans or specified herein without written authorization of the Engineer the Contractor shall replace such foundations with concrete fill or other suitable material approved by the Owner in a manner which will show by test an equal bearing capacity with the undisturbed foundation material. No additional payment shall be made for the added quantity of concrete fill or other suitable material used because of unnecessary over excavation caused by the Contractor or their operations.

3.4 EXCAVATION AND BACKFILL FOR TRENCHES

Excavation and backfill for trenches shall be in conformance with Sections 7-08 and 7-09 of the WSDOT Standard Specifications, and as further described herein. The following pipe materials shall be considered flexible:

- PVC
- Polyethylene Tubing
- FRP
- HDPE

- Polyethylene
- Corrugated Polyethylene

All other pipe materials shall be considered rigid.

Upon completion of work each day, all pipeline open trenches shall be completely backfilled, leveled, and temporarily patched or graveled, as herein specified. Under certain conditions, the trench may be left open at the last length of pipe laid during the day to avoid re-excavation the following morning, provided that the opening is adequately plated or covered for vehicle traffic. Special attention shall be given to barricading to keep vehicular traffic away from newly-backfilled trench areas until restored for traffic.

The Engineer reserves the right to restrict the Contractor in the amount of trench for pipeline that can be opened during the working day. Should the Contractor, in the Engineer's opinion, fail to diligently pursue backfilling, an allowable limit of open trench shall be 100 lineal feet and shall be strictly enforced.

The width of the trench at or below a point 12 inches above the top of the outside diameter of the pipe shall be carefully controlled and maintained to ensure the strength of the pipe and prevent pipe failures. Backfilling shall proceed as follows:

A. SUBGRADE PREPARATION

The subgrade for piping is defined as the elevation of the bottom of the pipe bedding material as shown on the Plans.

In the event unsuitable material is encountered below the subgrade shown on the Plans and described herein, the Contractor, as required by the Engineer, shall over-excavate until a suitable foundation is reached.

Quantities, if any, shall be calculated by neat line measurement to the depth agreed to in the field by the Engineer.

B. BEDDING FOR RIGID PIPE

Above the foundation material, if any, the bedding material shall be Gravel Backfill for Pipe Bedding, as specified in Section 02700. This material shall be placed in lifts of approximately 8 inches up to a point 12 inches above the pipe. This material shall be hand shoveled in place and carefully worked under and around the pipe.

C. **BEDDING FOR FLEXIBLE PIPE**

Above the foundation material, if any, Gravel Backfill for pipe bedding, as specified in Section 02700, shall be placed in lifts of approximately 8 inches up to a point 12 inches above the pipe. This material shall be hand shoveled in place and carefully worked under and around the pipe.

D. **BACKFILL FOR TRENCHES**

Partial backfill to protect the pipe will be permitted immediately after the pipe has been properly laid in accordance with the Plans and these Specifications. Complete backfilling of trenches will not be permitted until the section of pipe installed has been inspected by the Engineer.

From the point 12 inches above the top of the pipe barrel, the backfill material to be used in the trench section shall be Bank Run Gravel, as specified in Section 02700, except where required or shown on the Plans to use other material. The Contractor shall place backfill in horizontal lifts not to exceed 8 inches in thickness. All backfill shall be free of large rocks, organic matter, stumps, trees, pieces of pavement, broken concrete and other deleterious substances.

The Contractor shall remedy, at their expense, any defects that appear in the backfill prior to final acceptance of the work. Cleanup operations shall progress immediately behind backfilling to accommodate the return to normal use of the trench area.

3.5 DISPOSAL OF EXCAVATED MATERIAL

Excavated materials shall be hauled to an approved waste site(s), as selected by the Contractor. The Contractor shall submit a list of approved waste haul site(s) to the Owner prior to the commencement of hauling of waste materials. Any permits required for waste haul and disposal shall be the responsibility of the Contractor.

3.6 FINAL SITE GRADING

The site shall be graded consistent with the elevations shown on the Plans. The slopes between elevations shall be uniform or as shown on the Plans. Excavations and backfill shall be to the elevations required for the placement of all surface restorations, such as asphalt, concrete, gravel

surfacing, or landscaping. All areas shall be graded to provide proper drainage. The final ground surface shall be smooth, raked free of debris and stones, and prepared for restoration as specified in Section 02900.

3.7 TRENCH COMPACTION

Trench backfill materials shall be moisture conditions to within three percent of optimum moisture content. Water settlement is not allowed for compaction.

Pipe bedding materials, for both rigid and flexible pipes, shall be compacted to at least 95 percent of the maximum dry density, using the Modified Proctor, per ASTM D1557.

Compaction of the backfill above the bedding material in all trenches in non-structural and non-paved areas shall be performed by using mechanical equipment to at least 90 percent of the maximum dry density, using the Modified Proctor, per ASTM D1557.

Compaction of the backfill above the bedding material in all trenches in structural or paved areas shall be performed by using mechanical equipment to at least 95 percent of the maximum dry density, using the Modified Proctor, per ASTM D1557.

***** END OF SECTION *****

SECTION 02305

WET WEATHER EARTHWORK

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the procedures to be followed if earthwork is to be accomplished in wet weather or in wet conditions where control of soil moisture is difficult.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
02300	Earthwork
02370	Erosion Control
02700	Gravel Materials

PART 2 PRODUCTS

The size or type of construction equipment shall be selected as required to prevent soil disturbance. In some instances, it may be necessary to limit equipment size or to excavate soils with a backhoe, Gradall, or equivalent type of equipment to minimize subgrade disturbance caused by construction traffic.

Material used as structural fill during wet weather earthwork shall generally consist of clean granular material containing less than 5 percent fines (material passing the U.S. Standard No. 200 sieve), based on wet sieving the fraction passing the 3/4-inch sieve. The fines shall be non-plastic.

PART 3 EXECUTION

3.1 WET WEATHER EXCAVATION AND FILL PLACEMENT QUALITY CONTROL

Excavation and placement of fill or backfill material will be observed on a full-time basis by the Owner, to determine that all work is being accomplished in accordance with these Specifications.

3.2 WET WEATHER EARTHWORK PROTECTION

The ground surface shall be sloped away from construction areas to promote the rapid runoff of precipitation and prevent ponding of water.

Earthwork shall be accomplished in small sections to minimize exposure to wet weather. Excavation or the removal of unsuitable soil shall be followed immediately by the placement and compaction of a suitable thickness (generally 8 inches or more if approved by the Owner) of clean foundation gravel.

No soil shall be left uncompacted and exposed to moisture. A smooth drum vibratory roller, or equivalent, shall be used to seal the ground surface after placement of fill or backfill materials.

All wet weather work shall meet local, state and federal codes as specified herein and as indicated on the Plans.

***** END OF SECTION *****

SECTION 02370

EROSION CONTROL

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the temporary erosion and sedimentation control (TESC) in and around the site caused by the actions of the Contractor as shown on the Plans and as specified herein.

Work under this Section shall be directed towards site areas disturbed during construction as well as all off-site storage and parking areas maintained by the Contractor.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01160	Regulatory Requirements
01300	Submittals
02300	Earthwork

1.3 SUBMITTALS

A. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A SWPPP shall be prepared by the CESCL for the project and submittal in accordance with Section 01300 and paragraph 1.5 of this specification section. The SWPPP shall be submitted to the District for approval at the preconstruction conference.

1.4 CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL)

The Contractor shall designate a Certified Erosion and Sediment Control Lead (CESCL) for this project. The CESCL shall have, for the life of this Contract, a current Certificate of Training in Construction Site Erosion and Spill Control signed by the WSDOT Water Quality Program Manager.

Duties of the CESCL shall include, but are not limited to:

- A. Inspecting temporary erosion and spill control Best Management Practice (BMPs) for proper location, installation, maintenance, and repair. Inspections shall be made as noted on the Plans and after each significant precipitation event, including those that occur

during weekends and after working hours. A Temporary Erosion and Spill Control Inspection Report shall be prepared for each inspection and shall be included in the Temporary Erosion and Spill Control file. The inspection report shall include, but not be limited to:

1. When BMPs are installed, removed or changed;
2. Repairs needed or made;
3. Turbidity monitoring results;
4. Observations of BMP effectiveness and proper placement;
5. Recommendations for improving performance of BMPs.

B. Prepare and maintain a Temporary Erosion and Spill Control file on site that includes but is not limited to:

1. Temporary Erosion and Spill Control Inspection Reports;
2. Contractor's Stormwater Pollution Prevention Plan (SWPPP);
3. Spill Prevention, Control, and Countermeasures (SPCC) Plan;
4. All project permits, including but not limited to grading permits and Hydraulics Project Approval;
5. Manufacturer instructions for all products used for TESC BMPs;
6. Washington State Department of Ecology's Stormwater Management Manual for Western Washington, Chapter 4, Volume II, current edition.

1.5 STORMWATER POLLUTION PREVENTION PLAN

The CESCL Contractor shall be responsible for preparing a Stormwater Pollution Prevention Plan (SWPPP). The intent of the SWPPP is to reflect the Contractor's operations by supplementing the TESC Drawings, details, and notes shown on the Plans to provide comprehensive pollution control at the construction site, staging areas, stockpiles, and borrow sites. The SWPPP shall be prepared by the CESCL for the project and submittal in

accordance with Section 01300. The SWPPP shall be submitted to the Owner for approval at the preconstruction conference. No work shall begin until the Contractor's SWPPP, as approved by the Owner, is implemented. The SWPPP shall address, at least, the following items:

- Identification of construction haul routes and location of BMPs (e.g., stabilized construction entrance, silt fences, storm drain inlet protection).
- Waste disposal methods and locations.
- Detailed construction sequence and schedule, including identifying dates scheduled for BMP installation, removal, clearing, grading, seeding, and landscaping.
- Details for any temporary flow diversions, dewatering systems, and BMPs (in accordance with the current edition of the Washington State Department of Ecology's Stormwater Management Manual for Western Washington) proposed by the Contractor.
- Calculations for temporary sedimentation ponds, if used
- A list of products to be used, including Material Safety Data Sheets.
- Identification of stockpile and staging areas, and BMPs to be implemented at these locations.

The SWPPP shall be prepared in accordance with details shown on the Plans, these Specifications, and Chapter 4, Volume II Chapter 7 – BMPs from the current edition of the Washington State Department of Ecology's Stormwater Management Manual for Western Washington, which are hereby referenced and made a part of the Contract Documents. Only those sections of the Stormwater Management Manual for Western Washington that address preparation, implementation, and maintenance of permanent and temporary erosion and sedimentation control BMPs are applicable.

The SWPPP shall include best management practices to control windblown dust.

PART 2 PRODUCTS

2.1 SILT FENCES

Silt fences shall conform to the details shown on the Plans.

2.2 STORM DRAIN INLET (CATCH BASIN) PROTECTION

Storm drain inlet protection conform to the details shown on the Plans.

2.3 EROSION CONTROL BLANKET

On all disturbed slopes steeper than 2H:1V, an erosion control blanket shall be placed and secured per manufacturer's recommendation with a biodegradable means.

The erosion control blanket shall be temporary, biodegradable and is to remain in place.

The erosion control blanket shall be "Biomac C" as manufactured by MacCafferri, Inc. or "Curlex II," as manufactured by American Excelsior Co., or Equal.

PART 3 EXECUTION

3.1 PREPARATION

Site preparation work shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped.

3.2 BEST MANAGEMENT PRACTICES (BMPS)

Silt fences and straw bale dams shall be constructed to control erosion and migration of soils disturbed during construction. The fences and dams shall provide temporary protection and shall be removed only upon approval of the Owner.

All areas or drainage ways downstream of the construction site shall have Best Management Practices (BMPs) installed prior to the beginning of any clearing activities. Runoff from cleared or disturbed area shall be directed through the BMPs. Disturbed ground shall be stabilized at the end of each work day. Permanent soil stabilization and erosion and sedimentation control shall be implemented upon reaching finish grade. Slope protection

shall be immediately implemented upon any soils showing signs of erosion. This shall be done in a manner approved by the Owner.

All BMPs shall be inspected, maintained and kept in a condition sufficient to provide effective erosion and sedimentation control at all times. The site shall be inspected to ensure the BMPs are properly located, constructed and operating as designed during the first storm. Any necessary adjustments or repairs shall be made immediately and be approved by the Owner. The BMPs shall be inspected thereafter as noted on the Plans and after all significant storm events. Turbidity monitoring will be held on a weekly basis at a minimum, or more frequently if necessary as determined by the CESCL.

All BMPs shall be removed no later than 30 consecutive calendar days after final site stabilization has been achieved as determined by the Owner. BMPs such as storm drain inlet protection, straw bales, silt fences and supports and plastic coverings shall be removed and properly disposed of offsite by the Contractor. Areas disturbed by removal of these BMPs shall be immediately stabilized in a manner approved by the Owner.

***** END OF SECTION *****

SECTION 02530

UTILITY STRUCTURES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes precast concrete vaults, manholes, catch basins, castings, and steps for a complete installation as shown on the Plans and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
02300	Earthwork
08310	Access Hatches

PART 2 PRODUCTS

2.1 GENERAL

The exterior finish of all precast concrete utility structures shall be smooth with no imperfections larger than 1/8 inch in diameter. The interior finish of all precast concrete utility structures shall be smooth and sacked with non-shrink cementitious materials and epoxy bonding agent. No bug holes, fins, projections, or other defects are acceptable.

2.2 PRECAST VAULTS

Precast concrete vaults shall be cast in an established precast yard. Precast vaults shall be designed for H-20 loads. Submit design calculations and shop drawings for review and approval prior to fabrication. Shop drawings shall detail wall thickness, concrete strength, reinforcing requirements, and shall include all appurtenances, such as access hatches, floor drains, and other items called for on the Plans.

All vaults shall be constructed with a minimum of 4-inch-thick solid walls.

The access hatches shall be as specified in Section 08310.

2.3 GASKETS AND MANHOLE ADAPTERS

Rubber gaskets shall conform to Section 9-04.4 of the WSDOT Standard Specifications. Pipe connections to existing catch basins shall be made using a heavy duty sand collar with gasket, head, or equal. Pipe connections to new structures shall utilize an adapter coupling with gasket or watertight flexible rubber boot, Kor-n-Seal, or approved equal. The contractor shall provide Kor-n-Seal cavity O-rings to fill the annular spaces between the pipe and the structure wall.

PART 3 EXECUTION

3.1 PRECAST VAULTS

Precast vaults shall be installed as shown on the Plans and in accordance with the manufacturer's recommendations.

3.2 FINAL ADJUSTMENT AND CLEANUP

After installation is complete, the Contractor shall cleanout all precast structures prior to placing the new facilities into service. The adjustment of castings shall be done in a manner satisfactory to the Owner. Adjustment shall be done only with precast grade rings. Bricks are unacceptable. Grouting and final adjustment of castings shall be done with non-shrink grout.

***** END OF SECTION *****

SECTION 02534

STORM SEWERS

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes pipe, fittings, and accessories described herein and as required to completely install storm sewers as shown on the Plans.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
01400	Quality Control
02250	Temporary Shoring and Bracing
02300	Earthwork
02530	Utility Structures

PART 2 PRODUCTS

2.1 GENERAL

All materials delivered to the job site shall be new, free from defects, and marked to identify the material, class, and other appropriate data such as thickness for piping.

Acceptance of materials shall be subject to strength and quality testing in addition to inspection of the complete product. Acceptance of installed piping systems shall be based on inspection and leakage tests as specified in Part 3 of this Section.

2.2 CORRUGATED POLYETHYLENE PIPE

Corrugated polyethylene pipe (CPEP) and fittings shall conform to the requirements of AASHTO M-252 and AASHTO M-294, Type S. Fittings shall be as shown on the Plans and as required to provide a complete piping system and meet the same requirements as the CPEP.

2.3 CALDER-TYPE FLEXIBLE COUPLINGS

Flexible couplings shall be Calder-type where specifically indicated on the Plans. Calder-type flexible couplings shall consist of all elastomeric PVC sleeve secured to the pipes with stainless steel clamping bands. Adapter couplings shall be furnished for transitions between piping of different outside diameters as necessary.

Calder-type flexible couplings shall be as manufactured by Calder Co., Fernco, or equal.

PART 3 INSTALLATION

3.1 PIPE HANDLING

All types of pipe shall be handled in a manner that will prevent damage to the pipe.

Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations, and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned, and relayed. A clean whiskbroom shall be used for this purpose and for brushing to remove foreign matter prior to joining of pipe ends. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by a watertight plug or by other means approved by the Owner to ensure cleanliness inside the pipe.

Pipe shall be stacked in such a manner as to prevent damage to the pipe, to prevent dirt and debris from entering the pipe, and to prevent any movement of the pipe. The bottom tiers of the stack shall be kept off the ground on timbers, rails, or other similar supports.

3.2 TEMPORARY SHORING AND BRACING

Temporary shoring and bracing, including trench excavation safety systems, shall meet the requirements of Section 02250.

3.3 CPEP PIPE JOINING

CPEP piping shall be joined per the manufacturer's recommendations.

***** END OF SECTION *****

SECTION 02700

GRAVEL MATERIALS

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the various types of granular materials that are to be used in trenches and other excavations as shown on the Plans and as specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
02300	Earthwork

1.3 SUBMITTALS

The Contractor shall provide certificates of laboratory tests in accordance with Section 01300, indicating particle size distribution for review for each type of granular material furnished and proctor test reports for all material to be placed as pipe bedding material, trench backfill, backfill under and around structures and underneath crushed surfacing and asphalt concrete pavements.

The certificates and proctor test reports shall be provided to the Owner at least 5 calendar days prior to placement.

PART 2 PRODUCTS

2.1 FOUNDATION GRAVEL

Foundation gravel shall be Class A Gravel Backfill for Foundations in conformance with Section 9-03.12(1)A of the WSDOT Standard Specifications.

2.2 GRAVEL BACKFILL FOR PIPE BEDDING

Gravel backfill for pipe bedding shall meet the requirements of Section 9-03.12(3) of the WSDOT Standard Specifications except that no more than 5 percent passing shall pass the No. 200 Sieve.

Native granular material shall not be utilized for gravel backfill for pipe bedding.

2.3 BANK RUN GRAVEL FOR TRENCH BACKFILL

Bank run gravel for trench backfill shall be free from organic matter or other deleterious materials and in conformance with Section 9-03.19 of the WSDOT Standard Specifications.

2.4 CRUSHED SURFACING

Crushed surfacing base course and top course shall conform to Section 9-03.9(3) of the WSDOT Standard Specifications.

PART 3 EXECUTION

3.1 FOUNDATION GRAVEL

Foundation gravel shall be placed and compacted underneath all structures to a minimum depth of 12 inches unless indicated otherwise on the Plans, and to a greater depth where foundations are unstable and excess suitable excavated material is unavailable to stabilize such foundations.

In the event the Contractor unnecessarily overexcavates the pipe trench or structure foundation, or if the width of the pipe trench becomes wider than the pay limit shown on the Plans, all material so placed shall be at the Contractor's sole expense.

3.2 GRAVEL BACKFILL FOR PIPE BEDDING

Bedding material shall be placed simultaneously on both sides of the pipe for the full width of the trench in lifts not exceeding 6 inches. To assure uniform support, the material shall be carefully worked underneath the pipe haunches with a tool capable of preventing the formation of void spaces around the pipe. In the event the Contractor overexcavates the pipe trench, or if the width of the pipe trench becomes wider than the pay limit shown on the Plans, all material so placed shall be at the Contractor's sole expense.

3.3 BANK RUN GRAVEL FOR TRENCH BACKFILL

Bank run gravel for trench backfill shall be used where excavated material is unsuitable or unavailable for the backfill of trenches as approved by the Owner.

In the event the Contractor overexcavates the pipe trench, or if the width of the pipe trench becomes wider than the pay limit shown on the Plans, all material so placed shall be at the Contractor's sole expense.

3.4 CRUSHED SURFACING

Crushed surfacing base course and/or top course shall be placed underneath asphalt paving, to the lines and grades shown on the Plans or as required by the Plans and shall be compacted to a dense, unyielding state of at least 95 percent of the maximum dry density, using the modified Proctor, per ASTM D1557.

***** END OF SECTION *****

SECTION 02740

HOT MIX ASPHALT PAVING

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the construction of hot mix asphalt (HMA) paving. This Section also includes asphalt treated base (ATB) and temporary asphalt cold-mix for temporary repairs.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
01400	Quality Control
02300	Earthwork
02700	Gravel Materials

1.3 SUBMITTALS

The Contractor shall provide certificates of laboratory tests indicating current sieve analysis data and mix design for asphalt-treated base and hot mix asphalt pavement mix designs in accordance with Section 01300 and as further specified herein. The certificates shall be provided to the Owner at least 5 consecutive calendar days prior to placement of any materials.

PART 2 PRODUCTS

2.1 HOT MIX ASPHALT PAVEMENT

- A. Hot mix asphalt pavement, Commercial HMA, shall conform to Section 5-04.2 of the WSDOT Standard Specifications, 2018 Edition. Prior to the production of HMA, the Contractor shall determine a design aggregate structure and asphalt binder content in accordance with WSDOT Standard Operating Procedure 732. Once the design aggregate structure and asphalt binder content have been determined, the Contractor shall submit the HMA mix design on DOT form 350-042 demonstrating the design meets the requirements of Sections 9-03.8(2) and 9-03.8(6) of the WSDOT Standard Specifications. Mix designs shall be accepted by commercial evaluation. The contractor shall only complete the first

page of form 350-042. The contractor shall provide verification of mix design in one of the following processes:

1. Submit samples to WSDOT State Materials Lab for WSDOT verification testing in accordance with WSDOT Standard Specifications.
 2. Reference a mix design that has been previously verified by the WSDOT Field Verification Testing Process or verified by WSDOT State Materials Lab on a previous project.
- B. Mix design verification is valid for one year from the date of verification. At the discretion of the Owner, the Owner may accept mix designs verified beyond the verification year with certification from the Contractor that the materials and sources are the same as those shown on the original mix design.
- C. In no case shall the paving begin before the determination of anti-strip requirements has been made. Anti-strip requirements will be determined by:
1. Testing by Contractor in accordance with WSDOT TM 718.
 2. Historical aggregate source anti-strip use provided by WDOT.
 3. If the determination of anti-strip requirements has not been made through Item a. or b. above, then a minimum of 0.25 percent anti-strip will be used.
- D. The mix design will be the initial Job Mix Formula (JMF) for the HMA being produced. Any additional adjustments to the JMF will require the approval of the Owner and may be made per WSDOT Standard Specifications Section 9-03.8(7).

PART 3 EXECUTION

3.1 GENERAL

The contractor shall maintain access to the facility at all times. The Contractor shall coordinate all work with the Owner to insure their paving plan does not interfere with the Owner's ongoing operations.

The Contractor shall provide, place and maintain all temporary markings and signage as required to warn and direct facility traffic as necessary during their paving operations.

3.2 ASPHALT CONCRETE PAVEMENT PLACEMENT

Asphalt concrete pavement materials shall be placed on compacted subgrade materials, as shown on the Plans, as indicated elsewhere in these Specifications, and in conformance with Sections 5-04.3(1), 5-04.3(2), 5-04.3(3), 5-04.3(4), 5-04.3(9), 5-04.3(10), 5-04.3(11), 5-04.3(12), 5-04.3(13), 5-04.3(14) 5-04.3(16) and 5-04.3(20) of the WSDOT Standard Specifications.

No material transfer devices or vehicles shall be used on this project.

3.3 ASPHALT JOINTS

All joints of hot mix asphalt pavement shall be sealed with hot poured sealant meeting the requirements of WSDOT Standard Specification 9-04.2

3.4 QUALITY CONTROL

The Contractor shall be responsible for testing the ATB and HMA paving in accordance with the WSDOT Standard Specifications as specified herein, and with Section 01400. Testing shall include asphalt content and grading testing of hot mix asphalt mix samples, aggregate void content, fracture, and equivalence testing, and in-place density testing.

3.5 SAWCUTTING

Where shown on the Plans or where directed in the field by the Owner, the Contractor shall make a neat vertical sawcut at the boundaries of the area to be removed. Care shall be taken during sawcutting so as to prevent damage to the existing asphalt concrete, or concrete, to remain in place. Any pavement or concrete damaged by the Contractor outside the area scheduled for removal due to the Contractor's operations or negligence shall be repaired or replaced to the Owner's satisfaction by the Contractor at no additional cost to the Owner.

All cuts shall be continuous, full depth, and shall be made with saws specifically equipped for this purpose. No skip cutting, wheel cutting or jack hammering will be allowed unless specifically approved in writing by the Owner. However, even if approved as a method of cutting, no payment will be made for this type of work, and it shall be considered incidental and

included in the various unit contract and lump sum prices listed in the Proposal.

The location of all pavement cuts shall be approved by the Owner in the field before cutting commences.

All water and slurry material resulting from sawcutting operations shall not be allowed to enter the storm drainage or sanitary sewer system and shall be removed from the site and disposed of in accordance with the Washington State Department of Ecology regulations.

All existing asphalt concrete pavement edges shall be saw cut back to sound material, in uniform lines immediately prior to paving operations. Any edges broken between the time of cutting and placement of new paving shall be recut to the satisfaction of the Owner at no additional cost to the Owner. All excess excavated materials shall be hauled to waste.

3.6 ASPHALT TRENCH PATCH

This work shall consist of the preparation, placing and compaction of asphalt trench sections, in accordance with the details included on the plans and the requirements outlined herein. The work shall be in conformance with Sections 3.3 herein unless specifically directed otherwise by the Owner.

The Contractor shall restore all asphalt surfaces excavated or disturbed to a condition acceptable to the Owner.

The trench section shall be patched as indicated on the Plans. Crushed rock/ATB/temporary asphalt shall be removed to the depth of existing pavement or to the depth of the asphalt section specified on the Plans, whichever is thicker. The trench shall be paved to match the existing pavement surface.

Before any HMA material is placed, all pavement cuts shall be trued so that marginal lines of the patch will form a rectangle with straight edges and vertical faces a minimum of 1 foot back from the maximum trench width.

The asphalt shall be placed and compacted in 2-inch lifts. The asphalt trench patch thickness shall match existing asphalt thickness or the minimum pavement repair section indicated on the plans whichever is thicker.

Seal all joints scheduled to not receive an asphalt overlay.

***** END OF SECTION *****

SECTION 02820

CHAIN LINK FENCE AND GATES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the furnishing and installing of new chain link fence materials, and the modifications to the existing fence system conforming to the lines, grades, and details and at the locations as shown on the Plans.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
Section 4 01300	Measurement and Payment Submittals

PART 2 PRODUCTS

2.1 FENCING

The fence shall have continuous chain link wire, tension wire and three strands of barbed wire supported on angled extension arms. The chain link shall have a 2-inch diamond mesh and 9-gauge wire, meeting ASTM 668, Class 2b. The total height of the fence shall be as shown on the Plans. The fence shall be heavy steel guard fence with top and bottom rails and bottom tension wire. Top and bottom selvages of chain link fabric are to have a twisted and barbed finish.

Fabric shall be galvanized with 1.8 ounces per square foot.

The posts shall be equipped with extension arms, designed to carry three strands of barbed wire at an angle of 45 degrees. The topmost barbed wire shall be located approximately 12 inches above the fabric, and approximately 12 inches out from the fence line. Extension arms for line posts shall be of 14-gauge (minimum) pressed steel, provided with slots for securely fastening the barbed wires. Corner and fence post arms are to be of similar construction, and shall be constructed from a minimum of 12-gauge strip steel or heavy malleable iron, and shall be designed to provide sufficient strength to support the barbed wire.

Fence shall be provided with privacy slats as shown on the Plans. Slats shall be vertically oriented within the wire mesh fabric and shall be

comprised of plastic materials. Slats shall provide visual barrier to the interior of the fenceline, and shall be resistant to degradation from UV light, water, and exposure to the elements. Slats shall be provided with bottom channel that will allow the vertical slats to “lock” into place.

The barbed wire shall be of the 4-point pattern, each wire to be composed of two strands of No. 12-1/2-gauge wire, galvanized after weaving.

2.2 GATES

Gates shall be installed for the full opening shown on the Drawings as per the manufacturer’s recommendations.

Gateposts shall be provided in accordance with ASTM F900 and have a ball top.

PART 3 EXECUTION

3.1 TEMPORARY FENCING

The Contractor shall furnish and install temporary fencing around the site so as to protect the site and prevent unauthorized entry into the site. The Contractor shall also maintain the temporary fencing throughout the course of the construction and provide any and all security necessary for site safety and protection during periods when sections of the fence may be down or open. Temporary fencing shall be removed by the Contractor only after receiving written authorization from the Owner for its removal.

3.2 FENCING INSTALLATION

The chain link fencing shall be erected in straight lines between angle points by skilled workmen experienced in this type of construction, in accordance with the manufacturer’s recommendations and these Specifications. The new fence installation shall not commence until final grading is complete and finish grade elevations are established. The new fence shall be constructed to provide security for the site. There shall not be any gaps between finish elevations and the bottom links of the fence which would allow entrance into the site.

The site fence shall be constructed in conformance with Section 8-12 of the WSDOT Standard Specifications. The maximum spacing for line posts shall be 10-feet on center. Posts shall be set plumb in true line as shown on the Plans and the remainder of the hole filled with concrete that must extend around the posts to a point 2 inches above finished grade. The top surface shall have a crowned watershed finish.

Concrete shall be proportioned to provide at least 2,500 psi strength at 28 days. Materials, methods of proportioning, mixing, transporting and placing shall conform to Section 03300. After the concrete has set, accessories shall be installed; chain link fabric shall be fastened to end posts with stretcher bars and clamps and to line posts and top rail with wire or bands. Fastening of the fencing materials shall use materials shown on the Plans at the minimum spacing as shown on the Plans. Three lines of barbed wire shall be installed on the extension arms and drawn taut and secured at each bracket.

Gate posts shall be diagonally braced to adjacent line posts to ensure stability. Gates shall be hung and all hardware adjusted so that gates operate satisfactorily from open or closed position.

*****END OF SECTION*****

SECTION 02950

SITE RESTORATION AND REHABILITATION

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes areas requiring restoration or rehabilitation as shown on the Plans or specified herein, including those areas that shall be graded, restored with hydroseeding or sod, areas restored with concrete sidewalk and driveway, and areas containing certain improvements and landscaping on and along the right-of-way including the adjacent private properties. The work also includes repair and replacement of fencing and other property features impacted construction.

Particular care shall be taken to minimize damage to landscaped areas within and adjacent to construction areas. In the event that construction is to be carried out in landscaped areas, appropriate measures shall be taken to restore such areas to conditions existing prior to construction.

Surface restoration type and location are shown on the Plans.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
02230	Clearing and Grubbing
02300	Earthwork
02710	Gravel Surfacing
02740	Hot Mix Asphalt Paving
03300	Cast-In-Place Concrete

1.3 QUALITY ASSURANCE

A. PLANT MATERIAL

Quality, size, and conditions as determined by standards set forth in the American Association of Nurserymen Standard ANSI Z60.1.

B. FERTILIZER

Conform to Washington State Department of Agriculture Laws and Federal Specification O-F-241D pertaining to commercial fertilizers.

C. SEED

Conform to the standards for “certified”-grade seed or better.

Furnished in standard container on which the following information is shown: seed name, lot number, net weight, percentage of purity, germination, weed seed and inert material.

Furnish to the Owner duplicate copies of a statement signed by the vendor, certifying that each lot of seed has been tested by a recognized seed testing laboratory within 6 months before the date of delivery on the Project.

Seed that is wet, moldy, or otherwise damaged in transit or storage will not be accepted.

PART 2 PRODUCTS

2.1 HYDROSEEDING

The seed mixture for easement and property restoration shall have the following composition, proportion, and quality:

Alternative 1 Seed Mixture Typical Western Washington

Kind and Variety of Seed in Mixture	Percent By Weight	Minimum Percent of Pure Seed	Minimum Percent of Germination
Colonial Bent Grass (Highland or Astoria)	10%	9.8%	85%
Creeping Red Fescus (Illahee Rainier or Pennlawn)	40%	39.2%	90%
Perennial Rye Grass	30%	29.4%	90%
White Clover (Pre-inoculated)	20%	19.6%	90%
Maximum Percentage of Weed Seed	1.0%		
Maximum Inert and Other Crops	1.0%		

The seed mixture shall have the following composition, proportion and quality:

The seed shall be applied at a minimum rate of 120 pounds per acre.

A commercial fertilizer of the following formulation shall be furnished as specified, and all fertilizer shall be premixed prior to use on the job. The fertilizer shall be applied at the rate of 500 lbs. per acre.

Nitrogen (Inorganic) as N₂	Nitrogen (Organic) Ureaformaldehyde	Phosphorous as P₂O₅	as K₂O	Potassium lbs/Acre
10%	38%	20%	20%	500

The fertilizer shall contain a minimum of 60 percent slow-release nitrogen and all minor elements as well.

2.2 TOPSOIL

Topsoil shall have a pH value between 6 and 8, shall be fertile, friable, natural loam, containing 5 to 8 percent of humus, and shall be capable of sustaining vigorous lawn growth. Topsoil shall be free of any admixtures of subsoil, stones 2 inches in diameter or larger, clods of earth, plants or their roots, sticks, or other extraneous material. All topsoil shall be furnished as necessary and approved by the Owner to complete the required restoration and seeding.

PART 3 EXECUTION

3.1 HYDROSEEDING

Areas that have been cleared and grubbed and graded within the public right-of-way, which are not covered by gravel, concrete, or pavement, shall receive hydroseeding, fertilizing, and mulching. These areas shall be leveled, acceptable to Owner, existing topsoil broken up to a depth of 6 inches and hydroseeded. Graded areas shall receive 6 inches of topsoil prior to hydroseeding. Native materials selected by the Owner from material excavated for foundations and stockpiled onsite may be used for topsoil.

For those areas in which hydroseeding would be difficult, the Contractor may request approval from the Owner to hand-apply the hydroseeding mix. Approval shall be granted for hand-application only after reviewing and approving the procedure that the Contractor recommends.

Seeding, fertilizing, and mulching shall be installed in conformance with Sections 8-01 and 9-14 of the WSDOT Standard Specification.

Seeding, fertilizing, and mulching shall be installed using an approved type hydroseeder.

When weather conditions are not conducive to satisfactory results from seeding operations, the Owner may order the work suspended and it shall be resumed only when the desired results are likely to be obtained.

Areas that have received an application of mulching shall be inspected upon completion of the work and again on the completion of the application of seed and fertilizer.

3.2 TOPSOIL

Those areas to receive topsoil shall have the trenched backfilled to within 6 inches of the finished grade. A compacted 6-inch depth of topsoil shall then be applied to the subgrade. The Contractor may elect to utilize and stockpile existing and excavated topsoil material; however, no separate payment will be made for its use.

3.3 HYDROSEEDING, GRASS SOD, LANDSCAPING, WATERING MAINTENANCE AND PROTECTION

The Contractor shall water, protect and care for all seeded areas until fully established and healthy. Care shall include equipment and labor necessary to provide sufficient watering of all planted areas until final acceptance.

Watering of hydroseeded, grass sod, and landscaped areas shall be at the Contractor's expense until new plantings are fully established.

The Contractor shall guarantee landscaping materials and workmanship for a period of 2 years following the date of project acceptance. During the 2-year guarantee period, should any planted areas show signs of failure, such as dead or dying areas of grass or bare spots, or any shrubs or trees planted as part of the site restoration fail, the Contractor shall repair or replace all deficient seeded areas and replace all dead shrubs and trees to the satisfaction of the Owner. If any seeded areas or plants require replacement, the Contractor's maintenance and guarantee period applicable to the replaced plants shall extend for an additional 1-year period after the time of the replacement.

The Contractor shall mow all newly established lawn areas a minimum of two mowings. The first mowing shall be performed only after an established and healthy stand of grass is judged to have grown. The second mowing shall occur upon establishment of second healthy stand of grass (4 inches in height).

3.4 CONSTRUCTION ACCEPTANCE

The Contractor shall protect and care for all seeded and sodded areas until fully established and healthy. Care shall include equipment and labor necessary to provide sufficient and continuous watering of all seeded areas until final acceptance.

The Contractor shall guarantee landscaping materials and workmanship for a period of 2 years following the date of project acceptance. During the 2-year guarantee period, should any seed areas show signs of failure such as dead or dying areas of grass or bare spots, the Contractor shall repair or replace all deficient areas to the satisfaction of the Owner.

***** END OF SECTION *****

DIVISION 3

CONCRETE

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes schedules, notes, and details for the construction of cast-in-place concrete structures, landings, equipment piers, housekeeping pads and slabs on grade.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
01310	Project Meetings
01400	Quality Control

1.3 REFERENCES

This Section references the latest revisions of the following documents:

<u>Reference</u>	<u>Title</u>
ACI 117	Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 212.3	Chemical Admixtures for Concrete
ACI 301	Specifications for Structural Concrete
ACI 304	Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305	Hot Weather Concreting
ACI 306	Cold Weather Concreting
ACI 309	Guide for Consolidation of Concrete
ACI 318	Building Code Requirements for Structural Concrete and Commentary
ACI 350	Code Requirements for Environmental Engineering Concrete Structures and Commentary
ACI 347	Guide to Formwork for Concrete
ACI 350.1	Tightness Testing of Reinforced Engineering Concrete Structures and Commentary
ASTM C31	Making and Curing Concrete Test Specimens in the Field
ASTM C33	Concrete Aggregates
ASTM C39	Compressive Strength of Cylindrical Concrete Specimens

ASTM C42	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C94	Ready-Mixed Concrete
ASTM C131	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C143	Slump of Hydraulic Cement Concrete
ASTM C150	Portland Cement
ASTM C172	Sampling Freshly Mixed Concrete
ASTM C173	Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Air-Entraining Admixtures for Concrete
ASTM C309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C494	Chemical Admixtures for Concrete
ASTM C535	Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C618	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C881	Epoxy-Resin-Base Bonding Systems for Concrete

1.4 SUBMITTALS

Submittals shall be in accordance with Section 01300.

A. GENERAL

The submittal for each included concrete mix shall include, as a complete package, the following as defined below:

1. Concrete Mix Design
2. Certified Test Results
3. Sieve Analysis
4. Product Data

An incomplete concrete mix submittal package may render a rejection of the mix or could delay the review process.

B. CONCRETE MIX DESIGN

Submit mix design for the proposed mix to be used on the Project, indicating components, and proportions by weight, including any admixtures. Mix design shall state chloride content. Mix designs to be provided are:

1. Unspecified Concrete
2. Cement Grout

C. CERTIFIED TEST RESULTS

Submit laboratory test results indicating compressive strength of concrete in compliance with requirements specified herein and in accordance with ACI 301.

D. SIEVE ANALYSIS

Submit sieve analysis for proposed coarse and fine aggregates indicating components, source, gradation, and WSDOT aggregate source approval report, including WSDOT Aggregate Source ID.

E. PRODUCT DATA

Provide product data on all proposed admixtures, accessories, and embedded items to be used on the Project, including, but not limited to:

1. Cement; source and type
2. Air Entraining Agent
3. Water Reducing Admixtures
4. Pozzolans
5. Bonding Agents
6. Curing Compounds/Floor Hardeners
7. Non-Shrink Grout; Non-metallic and Metallic
8. Waterstops

9. Plastic Joint Formers

For admixtures other than those proposed for air entrainment, submit a letter from the manufacturer describing the benefits of its use for the project and effect of its use on the properties of the concrete. Product data shall expressly state admixtures are chloride free, or the manufacturer shall submit a letter certification stating the same.

F. MATERIAL DELIVERY TICKETS

Provide copies of all concrete and grout material delivery tickets for the Project to the Engineer.

1.5 QUALITY ASSURANCE

Perform work in accordance with ACI 301. Acquire cement and aggregates from same source for all work performed on the Project. Conform to ACI 305 when concreting during hot weather. Conform to ACI 306 when concreting during cold weather. Provide or coordinate field and laboratory testing as described later in this Section and under provisions of Section 01400.

1.6 COORDINATION

Coordinate work in accordance with provisions of Section 01310. Coordinate the placement of embedded items with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. FORMS FOR EXPOSED FINISH CONCRETE

Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on the Plans.

2.2 CONCRETE MATERIALS

A. CEMENT

ASTM C150, Type II – Moderate or Type I - II. Use one brand of cement throughout the project, unless otherwise approved by the Engineer. Provide low alkali cement where Alkali-Silica Reaction (ASR) mitigation measures are required by WSDOT Aggregate Source Approval.

B. FINE AND COARSE AGGREGATES

Comply with ASTM C33. Provide aggregates from a single source. Coarse aggregate shall be size designation 467 (Nominal size 1-1/2 inch to No. 4 sieve) for all liquid containing structures, and size designation 67 (Nominal size 3/4-inch to No. 4 sieve) for all other concrete. Aggregates shall show a loss of weight not exceeding 35 percent after 500 revolutions in a Los Angeles wear machine, when tested in accordance with ASTM C131 or ASTM C535. Aggregates shall be from a WSDOT approved source.

C. WATER

Clean, potable, and not detrimental to concrete, in compliance with ASTM C94.

2.3 ADMIXTURES

Except for air entrainment, use of all other admixtures used shall be subject to approval of the Engineer and at no additional cost to the Owner. Only admixtures expressly stated by the manufacturer as being chloride-free shall be used. Subject to compliance with requirements, products, which may be incorporated into the work include, but are not limited to, the following:

A. AIR ENTRAINMENT

ASTM C260 certified by manufacturer to be compatible with other proposed admixtures.

Master Builders MB AE 90 or MICRO-AIR
Sika AER
W.R. Grace Daravair or Darex Series

B. WATER REDUCING ADMIXTURE

ASTM C494 Type A.

Master Builders PolyHeed
Sika Plastocrete 161
W.R. Grace WRDA Series

C. ACCELERATING ADMIXTURE

ASTM C494 Type C.

Master Builders Pozzoloth NC534
Sika Plastocrete 161 FL
W.R. Grace Polarsset or DCI

D. WATER REDUCING, RETARDING ADMIXTURE

ASTM C494, Type D.

Master Builders Pozzoloth 100XR
Sika Plastiment
W.R. Grace Daratard Series

E. WATER REDUCING, ACCELERATING ADMIXTURE

ASTM C494, Type E.

Euclid Chemical Co. Accelguard 80
Master Builders Pozzutec 20
W.R. Grace Daraccel

F. HIGH RANGE WATER REDUCER (HRWR)

ASTM C494, Type F.

Master Builders Rheobuild 1000/3000 FC
Sika Sikament 10 ESL
W.R. Grace ADVA 100

G. HIGH RANGE WATER REDUCER AND RETARDER

ASTM C494, Type G.

Master Builders Pozzolith 440N
W.R. Grace Daracem-100

H. POZZOLAN

ASTM C618 - CLASS F, with a CaO maximum content of 10 percent.

2.4 ACCESSORIES

A. BONDING AGENT

ASTM C881, Type I and II, Grade 2, Class C, Epoxy Resin.
Subject to Contract requirements, provide one of the following or equal:

Sika Arimatec 110
Conspec SpecBond 100
W.R. Meadows Sealtight Rezi Weld 1000

B. CURING COMPOUND/CHEMICAL FLOOR HARDENER

ASTM C309, Type I, Class A and B. Subject to Contract requirements, provide one of the following or equal:

W.R. Meadows Sealtight 1100-Clear
Conspec RX cure
Chemrex, Inc. Masterkure
Burke Spartan-Cote WB

C. GENERAL PURPOSE NON-SHRINK NON-METALLIC GROUT

Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi (17 Mpa) in 48 hours and 7,000 psi (48 Mpa) in 28 days. Subject to Contract requirements, provide one of the following or equal:

Sika SikaGrout 212
Conspec 100 Non Metallic
Chemrex, Inc. Masterflow 928 Grout

2.5 CONCRETE MIX

A. GENERAL

Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method is used, use an independent testing facility acceptable to the Engineer for preparing and reporting proposed mix designs. The testing facility shall not be the same as that used for field quality control testing.

The maximum water soluble chloride ion content, expressed as a percent of the cement, contributed from all ingredients of the concrete mix, including water, aggregates, cementitious materials, and admixtures, shall not exceed 0.10 percent. Pozzolans may be counted as part of the total cementitious material in the concrete mix design. The cementitious material is the "minimum cement content" specified in the mix design for each type of concrete. When pozzolans are used as part of this "cement content," the minimum content shall be 15 percent by weight of the total cementitious materials (Portland cement and pozzolans) and not more than 20 percent.

Where ASR mitigation measures are required by WSDOT, provide a minimum of 15 percent pozzolan included in the cementitious material in the design mix.

B. MIX DESIGNS

Provide normal weight concrete with the following properties, unless noted otherwise on the Plans.

1. Unspecified Concrete

Structural concrete of general use in structures, sidewalks, and where no specific class of concrete is designated.

Minimum compressive strength @ 28 days: 3,500 psi

Minimum cement content: 5.5 sacks per cubic yard

Maximum water cement ratio by weight: 0.45

Nominal coarse aggregate size: 3/4" to No. 4 (size designation 67)

2. Cement Grout

Material for filling guard posts or for other uses as shown on the Plans. Cement grout shall be sand and cement only and shall not contain coarse aggregate.

Minimum compressive strength @ 28 days: 2,500 psi
Minimum cement content: 6.5 sacks per cubic yard
Maximum water cement ratio by weight: 0.54

C. ADMIXTURES

1. Air Entrainment

Use air-entraining admixture complying with ASTM C260 in all exterior exposed concrete. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement in accordance with ASTM C173 or C231 having total air content with a tolerance of plus or minus 1 percent within the following limits:

5.5 percent for 1.5 inch max. coarse aggregate size
6.0 percent for 1.0 inch max. coarse aggregate size
7.0 percent 0.50 inch or less max. coarse aggregate size

2. Other Admixtures

Use of all other admixtures shall be subject to the approval of the Engineer, and shall be in accordance with ACI 212.3 and Manufacturer's recommendations. Only admixtures stated by the manufacturer to be chloride free shall be used.

D. SLUMP LIMITS

Proportion and design mixes to result in concrete slump (1 inch \pm of the maximum) at the point of placement in accordance with ASTM C143 as follows:

Ramps, slabs, and sloping surfaces: 3 inches.

Reinforced foundation systems: 3 inches.

Other concrete: 4 inches.

Concrete containing HRWR admixture (super-plasticizer): Not more than 8 inches after addition of HRWR to site-verified 2- to 3-inch slump concrete.

E. CONCRETE MIXING

Comply with requirements of ASTM C94, and as herein specified.

During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than that specified in ASTM C94 may be required.

PART 3 EXECUTION

3.1 FORMS

Design, erect, support, brace, and maintain formwork to support vertical and lateral, static, and dynamic loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347.

Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.

Construct forms to sizes, shapes, lines, and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the work. Use selected materials to obtain required finishes. Solidly butt joints and provide back up at all joints to prevent leakage of cement paste.

Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast-in-place concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Provide Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set

tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

Chamfer all exposed corners and edges and other areas shown on the Plans, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

3.2 INSTALLATION OF EMBEDDED ITEMS

A. GENERAL

Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use installation drawings, diagrams, instructions, and directions provided by suppliers of items to be embedded.

B. CLEANING AND TIGHTENING

Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.3 PREPARATION OF FORM SURFACES

Clean reused forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

Thin form coating compounds only with thinning agent of type, amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.4 PREPARATION OF EXISTING CONCRETE SURFACES

The Contractor shall bush hammer all existing concrete surfaces that are to have new concrete cast against them. Apply epoxy bonding agent prior to placing concrete.

3.5 CONCRETE PLACEMENT

A. GENERAL

Comply with ACI 304 and as herein specified.

Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Apply temporary protective covering to lower 2 feet of finished walls adjacent to poured floor slabs and similar conditions, and guard against spattering during concrete placement.

B. PLACING CONCRETE IN FORMS

Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.

Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

C. COLD WEATHER PLACING

Protect concrete work from physical damage or reduced strength, which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

When air temperature has fallen to or is expected to fall below 40 degrees F (4 degrees C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F (10 degrees C), and not more than 80 degrees F (27 degrees C) at point of placement.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

D. HOT WEATHER PLACING

When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F (32 degrees C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is at Contractor's option.

Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed. Upon approval, water-reducing retarding admixture (Type D) may be used when required by high temperatures, low humidity, or other adverse placing conditions.

3.6 FINISH OF FORMED SURFACES

Provide smooth form finish for all formed concrete surfaces exposed-to-view including all surfaces exposed to water or wastewater, or that are to be covered with a coating material applied directly to the concrete, or a

covering material applied directly to concrete, such as veneer plaster, painting, or other similar type of system.

A. SMOOTH FORM FINISH

This is to be the as-cast concrete surface obtained utilizing selected form facing material, arranged orderly and symmetrically with a minimum of seams, and as specified herein.

Repair and patch tie holes and defective areas, with all fins or other projections completely removed and smoothed, by one of the following methods:

1. Provide smooth rubbed finish to concrete surfaces after form removal. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
2. Provide grout "sacked" cleaned finish. The sacking grout shall be one part Portland cement to 1-1/2 parts fine sand by volume, and mixed with water to consistency of thick paint. Proprietary additives such as epoxy bonding agents or adhesives may be used at Contractor's option. Blend standard Portland cement and white Portland cement, amounts to be determined by trial patches, so that final color of dry grout matches adjacent surfaces. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep sacked surfaces damp by fog spray or other acceptable method so surfaces do not dry out.

3.7 CONCRETE CURING AND PROTECTION

A. GENERAL

Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep concrete continuously wet for not less than 7 days. Begin final curing procedures immediately following initial curing and before concrete has dried out. Continue final curing for at least 7 days in accordance with ACI 301 curing methods. Avoid rapid drying of concrete at the end of final curing period.

B. CURING METHODS

Perform curing of concrete by use of curing and sealing compound, by moist curing, by moisture-retaining cover curing, or by combinations thereof, as herein specified.

Provide moisture curing by the following methods. Keep concrete surface continuously wet by covering with water, or provide continuous water-fog spray.

Covering concrete surface with absorptive cover, thoroughly saturating cover with water and keeping continuously thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.

Provide moisture-cover curing as follows: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in wide as practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walls, sidewalks, and curbs, as follows:

Apply curing and sealing compound to concrete slabs and walls as soon as initial curing operations are complete or immediately after the forms have been stripped (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Completely cover the concrete surfaces with curing and sealing compound. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair any damage during curing period.

Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to the Engineer.

C. CURING FORMED SURFACES

Cure formed concrete surfaces, including undersides of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period and until forms are removed. When forms are removed, continue curing by methods specified above, as applicable.

D. CURING UNFORMED SURFACES

Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of an appropriate curing method.

Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture retaining cover.

3.8 SHORES AND SUPPORTS

A. REMOVAL OF FORMS

Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F (10 degrees C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. FILLING-IN

Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work. Fill-in all form tie holes and other forming system holes with non-shrink grout.

B. BASE PLATE, EQUIPMENT BASES AND FOUNDATIONS

Provide machine and equipment bases (housekeeping pad/pier) and foundations, as shown on the Plans. Set anchor bolts for machines and equipment with template at correct elevations,

complying with certified diagrams or templates of manufacturers furnishing machines and equipment.

Provide 4-inch-high, square or rectangular concrete pad around all conduits and small diameter pipes that penetrate through floor slabs.

Provide leveling grout under base plates and equipment frames using non-metallic, non-shrink grout. Minimum thickness for leveling grout shall be 1/2 inches unless noted otherwise on the Plans or specified by equipment manufacturer.

3.10 CONCRETE SURFACE REPAIRS

A. PATCHING DEFECTIVE AREAS

Repair and patch defective areas immediately after removal of forms. Cut out honeycomb, rock pockets, voids or bugholes over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. For water and wastewater containment structures, utilize an epoxy resin bonding agent. Place patching mortar after bonding compound has dried.

For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

B. REPAIR OF FORMED SURFACES

Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of the Engineer. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, bug holes, honeycomb, rock pockets; fins and other discolorations that cannot be removed by cleaning. Flush out form tie holes and form bolt holes, fill with non-shrink grout, or precast concrete cone plugs or rubber plugs secured in place with bonding agent or epoxy adhesive.

Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. All repairs shall be approved by the Engineer. If defects cannot be repaired, the Contractor shall remove and replace the concrete.

C. REPAIR OF UNFORMED SURFACES

Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.

Repair finished unformed surfaces that contain defects, which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01 inches wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.

Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to the Engineer.

Repair defective areas, except random cracks and single holes not exceeding 1-inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3 inches of clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method. Groove top of cracks and cutout holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding

agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

Perform structural repairs with prior approval of the Engineer for method and procedure, using specified epoxy adhesive and mortar. Repair methods not specified above may be used, subject to approval of the Engineer. If acceptable repairs cannot be made, the Contractor shall remove and replace the concrete at no cost to the Owner.

3.11 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. GENERAL

Sampling and testing for quality control during placement of concrete shall include the following:

1. Sampling Fresh Concrete

ASTM C172, except modified for slump to comply with ASTM C94.

2. Slump

ASTM C143: one test at point of discharge for each day's placement of each type of concrete; additional tests when concrete consistency seems to have changed.

3. Air Content

ASTM C173, volumetric method for lightweight or normal weight concrete; ASTM C231 pressure method for normal weight concrete; one for each day's placement of each type of air-entrained concrete.

4. Concrete Temperature

Test hourly when air temperature is 40 degrees F (4 degrees C) and below, and when 80 degrees F (27 degrees C) and above; and each time a set of compression test specimens is made.

***** END OF SECTION *****

DIVISION 7

THERMAL AND MOISTURE PROTECTION

SECTION 07900

CAULKING AND SEALANTS

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section applies to the furnishing of all labor, materials, tools, and equipment required to install caulking and sealants as called for on the Plans and as specified herein.

All exterior wall joints and interior and exterior joints between all differing or dissimilar materials and at windows, doors, roof penetrations, louvers and similar types of openings shall receive sealants to make the joint air and watertight. This includes concrete to CMU, concrete to wood, CMU to wood, concrete to sheet metal, CMU to sheet metal, etc.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals

PART 2 PRODUCTS

2.1 POLYURETHANE SEALANT

Provide two-component urethane elastomeric compound with 100 percent solids content and the following performance characteristics: 150 psi tensile strength, when tested in accordance with ASTM D412; not more than 45 Shore "A" Hardness; 400 percent ultimate elongation; no apparent change and no increase in hardness, when exposed for a minimum of 3,000 hours in twin arc weatherometer with ultraviolet and water cycles. Provide at expansion, construction, and control joints in exterior and interior concrete slabs or other horizontal or vertical surfaces where indicated on the Plans, and as specified.

Subject to Contract requirements, provide one of the following manufacturer's products:

Sika:
www.sikaconstruction.com

BASF Construction Chemicals, LLC Building Systems:
www.BuildingSystems.BASF.com

Tremco Commercial Sealant and Waterproofing:
www.tremcosealants.com

2.2 TAPE SEALANT

Conform to the performance requirements of the American Architectural Manufacturer's Association Specifications AAMA 804 and AMMA 807, in accordance with ASTM D898.

2.3 ACRYLIC LATEX CAULK

Provide for non-working interior joints at surfaces to be painted (interior use only). Provide DAP Acrylic Latex Caulk, or approved equal. Material shall be a smooth extruding single-component latex based caulk suitable to receive paint.

2.4 SILICONE SEALANT

Provide silicone single-component non-sag sealant. Silicone shall only be used for interior applications. Provide Dow Corning 790 Building Sealant, or equal.

2.5 PRIMERS

Provide primer materials made by or recommended by the various Sealant or Caulking Manufacturers, for the conditions of the application, including the materials to be sealed at the joints, and the type of sealant or caulking material to be used.

2.6 JOINT BACKING MATERIALS

A. FILLER FOR EXPANSION JOINTS IN EXTERIOR SLABS

Provide preformed non-absorbent resilient material conforming to ASTM D1752, Type I; 1/2-inch width X depth required to bring the top surface to within 1/2 inch of the slab surface, or as indicated on the Plans.

B. FILLER FOR EXTERIOR JOINTS

Provide Sandell Manufacturing Company, "Polytite-B," or equal. Provide backing material as required for sealants at exterior joints.

C. ROPE YARN

Provide raveled strands of non-staining fiber or cotton wicking, in continuous lengths and in sizes as required to fill joints completely.

2.7 WALL JOINTS (HORIZONTAL AND VERTICAL)

Backer rod or backing material shall be closed cell PVC foam or expanded urethane; "Sonofom" by Sonneborn; "Expandofom" by Williams or equal.

Sealant primers, where required, shall be obtained from the same manufacturer. (See requirements for primer compatibility with concrete curing compound in Part 3 below.)

Provide polyurethane sealant at all wall and slab joints.

PART 3 EXECUTION

3.1 GENERAL

Contractor shall confirm that these sealant and primer materials are compatible with the concrete curing compound used, or Contractor shall lightly sandblast and thoroughly clean concrete prior to application of caulking and sealant materials. Exterior priming or sealant work shall not be done when it is raining or snowing, or when moisture therefrom, or dew, is present on surfaces. All exterior dissimilar materials shall be sealed with elastomeric sealants at the joints between the different materials.

3.2 APPLICATION OF SEALANTS

A. PREPARATION OF JOINTS

Inspect surfaces of joints prior to application. Joint sealants shall be installed before other surface finishes are applied. All joints must be solvent cleaned, free of dust, oils and grease before receiving backing materials and sealant. Floor joints must be wire brushed, free of laitance or other residues. Joints shall be completely dry before sealant work is done. Aluminum or other metal surfaces to be in contact with sealants shall be wiped clean with xylol or an MEK solvent to remove any coatings or contamination.

With two component sealants, mask both sides of joints with masking tape to prevent soiling floor, slab, or wall beyond limits of the joint.

B. BACKINGS

Install filler and backer materials in as long of lengths as practicable. Stretch and force into joints with tool designed for that purpose, to a uniform depth, as indicated on the Plans, allowing for installation of sealant and caulking. Provide filler material in slab shapes for joints 1/2 inch or more in depth, and in 3/4 inch or more wide joints to receive sealing material. Provide extruded rod backer material in all other joints to receive sealant. Provide rope yarn in joints to receive caulking compound. Install foil or other suitable bond breaker between backing materials and sealant.

C. MIXING

Where sealing materials require mixing, carefully mix components in strict accordance with the manufacturer's recommendations.

D. PRIMING

Apply primer to all surfaces of joints in contact with sealant materials. Apply full strength and undiluted in a uniform coating of surface. Allow to set or cure prior to proceeding. Do not prime surfaces at back of joint.

E. APPLICATION

Sealant shall be gun applied, giving the joint a full bead of sealant. Skin beads are not acceptable. Tool the bead immediately after application to ensure a firm and full contact with the inner faces of the joint. Do not apply sealants to wet or damp surfaces nor in temperatures below 50 degrees F. Strike off excess sealant with tooling stick or a knife so that finished bead is slightly below surface. Remove excess sealant as work progresses. Sealants in masonry wall joints are to be a maximum of 1/2-inch deep and not less than 1/4 inch in each dimension. Any joints over 1/2-inch wide shall be reported to the Owner and instructions for correcting the applications will be given.

3.3 FINISHING OF JOINTS

Before applying any sealing materials, verify that all contact surfaces have been uniformly coated with primer. Replace any maskings that have been torn or damaged. Apply in continuous beads over backing, using only tools and equipment designed for application of the materials. Fill all joints solid, with no voids. Superficial pointing with skim bead shall not be acceptable. Joints in sills and other wash surfaces shall be filled slightly convex to obtain a flush joint when dry. Entire perimeter of openings in concrete surfaces shall be sealed. Finish by tooling, as necessary for watertight, clean, neat, uniform joints. When applying sealant, do not permit thickness of sealant to exceed 1/2 of the width of the joint.

3.4 CLEANUP

Upon completion, the Contractor shall remove and dispose of masking materials. Remove any excess materials and clean adjacent surfaces free from any soil or stain resulting from sealing and caulking operations.

***** END OF SECTION *****

DIVISION 8
DOORS AND WINDOWS

SECTION 08310

METAL ACCESS HATCHES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section consists of the Contractor furnishing and installing 1 aluminum access hatch and accessories as shown on the Plans and as specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
02740	Asphalt Concrete Paving
Division 16	Electrical

1.3 QUALITY ASSURANCE

Access hatches shall be guaranteed against defects in material and/or workmanship for a period of 10 years by the manufacturer.

1.4 EQUIPMENT LIST

The metal access hatches to be installed are as follows:

<u>Location</u>	<u>Clear Opening (min)</u>	<u>Type</u>
Booster Station – Electrical Vault	23" x 23"	Type 2
Reservoir Access Hatch 2	4'-6" x 4'-6"	Type D
Reservoir Access Hatch 3	6'-6" x 6'-6"	Type D

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

Metal access hatches shall be as manufactured by Halliday Products, Inc., Bilco, L. W. Hatch, or equal.

2.2 ACCESS HATCH TYPE 2

Type 2 access hatches shall be Halliday H1W series, or equal. The hatches shall have a 1/4-inch-thick one-piece mill finish, extruded aluminum channel frame, incorporating a continuous concrete anchor. A

1-1/2-inch drainage coupling shall be located in the front left corner of the channel frame, unless shown otherwise on the Plans. A bituminous coating shall be applied to the frame exterior where it comes in contact with concrete. The door panel shall be 1/4-inch aluminum diamond plate reinforced to withstand a live load of the H-20 designation. The door shall open to 90 degrees and automatically lock with a stainless steel hold-open arm shall incorporate an enclosed stainless steel compression spring assist. The door shall close flush with the frame and rest on a built-in neoprene cushion/gasket. Hinges and all fastening hardware shall be stainless steel. The unit shall lock with a stainless steel slam lock with removable key and have a non-corrosive handle. The unit shall be guaranteed against defects in material and/or workmanship for a period of 10 years.

2.3 ROOF HATCH, TYPE D

A. Roof hatches shall be Type D Roof Hatch by The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-535-1582, Web: www.BILCO.com. or equal, per sizing specified on the plans.

B. Performance characteristics:

1. Covers shall be reinforced to support a minimum live load of 40 psf (195kg/m²) with a maximum deflection of 1/150th of the span or 20 psf (97 kg/m²) wind uplift.
2. Operation of the covers shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
3. Operation of the covers shall not be affected by temperature.
4. Entire hatch shall be weather tight with fully welded corner joints on covers and curb.

C. COVERS

Shall be 11-gauge (2.3mm) aluminum with a 3-inch (76mm) beaded flange with formed reinforcing members. Covers shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.

D. COVER INSULATION

Shall be fiberglass of 1-inch (25mm) thickness, fully covered and protected by a 18 gauge (1mm) aluminum liner.

E. CURB

Shall be 12 inches (305mm) in height and of 11-gauge (2.3mm) aluminum with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners.

F. CURB INSULATION

Shall be rigid, high-density fiberboard of 1-inch (25mm) thickness on outside of curb.

G. LIFTING MECHANISMS

Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe [for aluminum construction: welded to the curb assembly; for steel construction: through bolted to the curb assembly].

H. HARDWARE

1. Heavy pintle hinges shall be provided.
2. Covers shall be equipped with an enclosed two-point spring latch with interior and exterior turn handles.
3. Roof hatch shall be equipped with an exterior padlock hasp.
4. The latch strike shall be a stamped component bolted to the curb assembly.
5. Covers shall automatically lock in the open position with a rigid hold open arm equipped with a 1-inch (25mm) diameter red vinyl grip handle to permit easy release for closing.
6. Hardware: All hardware shall be zinc plated and chromate sealed.

7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

- I. FINISHES

Factory finish shall be mill finish aluminum.

PART 3 EXECUTION

Units shall be installed as specified herein and as shown on the Plans and according to the manufacturer's recommendations for safe and proper storage.

***** END OF SECTION *****

SECTION 08810

GLAZING

PART 1 GENERAL

1.1 SCOPE

The Contractor shall furnish and install glazing above Access Door No. 2 as shown on the Plans and as specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01200	Measurement and Payment
01300	Submittals

1.3 REFERENCES

“Glazing Manual,” issued by the Glass Association of North America, latest edition, hereinafter called “GANA.”

1.4 LABELS

Except where cutting of glass makes this requirement impossible, labels showing manufacturer’s name, quality of glass, and thickness of glass required, shall be furnished on each piece of glass.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

Glass manufacturers shall be AGC Glass Company, Cardinal Glass Industries, Vitro Architectural Glass, or equal.

2.2 TEMPERED PLATE GLASS

Provide 1/4-inch thick, Kind FT, Type 1, Class 1 Clear, Quality “Q3” tempered plate glass per ASTM C1036 and C1048.

Comply with all requirements of the International Building Code.

2.3 SETTING MATERIALS AND ACCESSORIES

The Contractor shall provide setting blocks, gaskets, clips, shims, and beads, as applicable and shall provide tapes, compressible foam, and glazing sealants as recommended by the Window Manufacturer. All materials shall be in accordance with FGMA Standards.

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall install glazing in accordance with manufacturer's directions and GANA Standards. Do not glaze in rainy weather without adequate overhead cover, nor at temperatures below 40 degrees F.

3.2 PREPARATION

The Contractor shall measure carefully prior to any cutting and fabricating and shall remove all rivet, screw, bolt or nail heads, welding fillets, or other projections from specified clearances in glazing rabbet.

3.3 GLASS POSITIONING

Center in rabbet to maintain noted clearances on all four sides, indoors and out. Set sheet glass with waves or draw horizontally. Clearance shall be in accordance with manufacturer's recommendations for size and thickness.

3.4 GLAZING

A. GENERAL

Sizes necessary to provide the required edge clearances shall be determined by measuring the actual opening to receive glass. Labels shall be left in place until the installation is approved. Movable items shall be secured, fixed, or in a closed and locked position until glazing compound has set. Preparation of surrounds and glazing, unless otherwise indicated or approved, shall be in conformance the GANA Glazing Manual.

Apply heal bead of sealant continuously at sill and not less than 5 inches up each jamb. Install compression gasket on interior or exterior, and apply removable stop. Complete sealant application in accordance with GANA.

B. TEMPERED GLASS

Premeasure and cut tape to lengths required. Adhere to fixed stops, setting tape at heads and sills before jambs. Install tape with butt joints; no overlaps shall be permitted. Set tapes straight and level with sight line of interior or exterior stops, as required. Position glass against tapes forming uniform seals.

***** END OF SECTION *****

DIVISION 9

FINISHES

SECTION 09900

PAINTING

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section covers the furnishing and installation of protective coatings, complete-in-place. Special shop coatings and/or factory-applied finishes on manufactured or fabricated items may be specified elsewhere. Regardless of the number of paint coats previously applied, at least two field coats of paint shall be applied to all surfaces unless otherwise specified herein. Field painting is not required for factory prefinished equipment items such as pumps, blowers, motors, etc. Touchup of the factory applied coatings may be required.

The word "paint" as used herein shall be taken to include all protective coatings and incidental materials as required with the exception that anodized aluminum or zinc galvanized coatings shall not be considered as paint.

Unless specifically noted otherwise in these Specifications or on the Plans, all work performed under this Contract (both new work and modifications to existing facilities) shall be painted. If an existing wall or ceiling (or similar surface) is modified in some way, the entire wall or ceiling surface is to be painted.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
07900	Caulking and Sealant
Division 11	Equipment
Division 15	Mechanical
Division 16	Electrical

1.3 REFERENCED STANDARDS

The following standards are referenced and shall be considered a part of these Specifications:

American National Standards Institute (ANSI):
A159.1, Surface Preparation Specifications;
Z53.1, Safety Color Code for Marking Physical Hazards

American Society for Testing and Materials (ASTM):

D4263, Standard Test Method for Indicating Moisture in Concrete
by the Plastic Sheet Method

E84, Standard Test Method for Surface Burning Characteristics of
Building Materials

National Fire Protection Association (NFPA):

101, Life Safety Code

Steel Structures Painting Council (SSPC):

SP-1, Solvent Cleaning

SP-2, Hand Tool Cleaning

SP-3, Power Tool Cleaning

SP-5, White Metal Blast Cleaning

SP-6, Commercial Blast Cleaning

SP-7, Brush-off Blast Cleaning

SP-10, Near-White Blast Cleaning

SP-11, Power Tool Cleaning

SP-13 Surface Preparation for Concrete Surfaces

VIS-89, Visual Standard

1.4 DEFINITIONS

A. PAINT

Includes fillers, primers, sealers, emulsions, oils, alkyds, latex, enamels, thinners, stains, epoxies, vinyls, urethanes, shellacs, varnishes and any other applied coating specified within these Specifications or shown on the Plans.

B. FINISHED ROOM OR SPACE

One that has a finish called for on Room Finish Schedule, or is indicated on the Plans, or is specified herein, to be painted.

C. PAINTING COVERAGE RATE

Coverage's expressed in SF/GAL/coat are the manufacturer's published theoretical coverage's in square feet per gallon per coat.

1.5 SUBMITTALS

In addition to the general submittal requirements listed in Section 01300, the following shall be submitted:

1. Written acknowledgment and certification that products submitted meet requirements of standards referenced in this Section.
2. Manufacturer's application instructions for primer and finish coats.
3. Manufacturer's surface preparation instructions.
4. Manufacturer's full line of color samples for color selection by Owner.
5. If products being used are manufactured by a company other than the specified reference standard, the Contractor must provide a complete comparison of the proposed products with the specified reference products per Part 2.1 requirements, including application procedure, coverage rates, and verification that product is designed for intended use. Information must be provided that demonstrates that manufacturer's products are equal to the performance standards of products manufactured by the Tnemec Company, which is the reference standard.
6. Manufacturer's approval of protective coating systems applicator.
7. List of Applicator's experience and qualifications. A minimum of 5-years of experience in the painting of wastewater treatment plant facilities required.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

The following is an approved coating systems manufacturers list subject to compliance with the Specifications contained herein:

1. Ameron Protective Coatings Division.
2. Sherwin Williams.
3. Tnemec Company.
4. Or equal.

The specified coating shall be understood as establishing the type and quality of coating desired. Other manufacturers' products will be accepted

provided sufficient information is submitted to allow the Engineer to determine that the coatings proposed are equivalent to those named. Proposed coatings shall be submitted for review in accordance with these Specifications. Requests for review of equivalency will not be accepted from anyone except the Contractor, and such requests shall not be considered until after the Contract has been awarded.

No substitutions shall be allowed that change the number of coats, thickness or generic type of paint required. All materials shall be brought to the jobsite in the original sealed and labeled containers of the paint manufacturer and shall be subject to inspection by the Engineer.

No coating materials other than those specified shall be brought to the jobsite. Thinners, driers and oils brought to the jobsite shall be only those recommended and approved by the paint manufacturer.

All paint shall conform to the applicable air quality regulations at the point of application. Any paint material which cannot be guaranteed by the manufacturer to comply, whether specified by product designation or not, shall not be used.

It shall be the responsibility of the Contractor to ensure the compatibility of the field painting products which will be in contact with each other or which will be applied over shop painted or previously painted surfaces. Paint used in successive field coats shall be produced by the same manufacturer. Paint used in the first field coat over shop painted or previously painted surfaces shall cause no wrinkling, lifting, or other damage to the underlying paint.

All paint used for intermediate and finish coats shall be guaranteed by the paint manufacturer to be fumeproof and suitable for wastewater plant atmospheres containing hydrogen sulfide. Any paint that cannot be so guaranteed shall not be used. Paint shall be lead-free and mercury-free if available, but in no case shall the lead or mercury content cause discoloration in a wastewater plant atmosphere.

Tnemec Company products are the reference standard and Tnemec designations for product type are used herein. Requirements for an approved equal product are listed below:

1. For approval of an equal manufacturer. The Contractor shall provide to the Owner in writing a detailed side-by-side comparison of the proposed equal Products Characteristics, Performance Characteristics, and Application Conditions for each Tnemec coating specified in this specification. For consideration for approval

this written comparison shall be certified and notarized by an officer of the proposed manufacturer as true and correct.

2. For Products Characteristics this detailed side-by-side comparison shall include for example, but not limited to, Volume Solids, Weight Solids, VOC, Mix Ratio, Zinc Content in Dry Film (by Weight), Spreading Rate per coat, Drying Schedule, Shelf Life and Flash Point.
3. For Performance Characteristics this detailed side-by-side comparison shall include for example, but not limited to, Abrasion Resistance, Corrosion Weathering, Direct Impact Resistance, Dry Heat Resistance, Flexibility, Moisture Condensation Resistance, Pencil Hardness, Salt Fog Resistance, Slip Coefficient and Wet Heat Resistance
4. In addition to the detailed side-by-side comparison for approval of an equal manufacturer, The Contractor shall provide to the Owner in writing five similar installations that have had the proposed or equal coating system and date coating system was put into service. In addition the installations names, locations, and owner's name with contact person and telephone number shall be provided.
5. For consideration for approval as an equal coating system the detailed side-by-side comparison shall be submit, with successful bidder's Shop Drawing at the time of the Preconstruction Conference, along with any proposed monetary adjustments to the contract price. As with all shop drawings, final approval rests with the Owner.
6. As a minimum standard any equal coating system shall have a 5-year service history on its coating system.

2.2 PAINT SYSTEMS

A. METAL DOORS AND WINDOWS, FRAMES AND TRIM

1. Scope

This Section shall apply to all interior and exterior hollow metal doors and windows, frames and trim.

2. Surface Preparation

Metal doors shall be machine-tool prepped per SSPC-SP-3. Prior to field coat application, the surface shall be solvent cleaned SSPC-SP-1, and shall be clean, dry and free of all dirt, oil, grease and any other contaminants.

3. Coatings

Primer System:

Coat One

Product: Tnemec Series 27 Typoxy

MDFT: 3 to 5 mils

Finish System:

Coat One

Product: Tnemec Series 73 Endurashield

MDFT: 3 to 5 mils

Total MDFT: 6.0 mils

B. EXPOSED TO VIEW EXISTING EXTERIOR CONCRETE

1. Scope

This section shall apply to all exposed to view existing exterior concrete surfaces.

2. Surface Preparation

The exterior concrete surface shall be thoroughly cleaned and high pressure washed per SSPC-SP-14, Section 4.3.2.

3. Coatings

Finish System:

Two Coats:

Product: Envirocrete, Tnemec Series 156

MDFT 8 mils of finish product

PART 3 EXECUTION

3.1 GENERAL

It is the intent of these Specifications that materials and workmanship be provided such that the highest quality job is obtained. The completed work, prior to acceptance, must be free from runs, skips, mars and any other disfiguring mark due to faulty workmanship or care of the completed work.

It is the responsibility of the Contractor to ensure that all surfaces are prepared in accordance with the written recommendations and directions of the paint manufacturer whose paint is applied.

Approval of conditions shall be obtained from the Engineer prior to applying any or all coats of paint; however, such approval shall not relieve the Contractor of his responsibility of conformance with these Specifications and conformance with the manufacturer's recommendations.

It shall be the responsibility of the Contractor to prevent settling of dust or the occurrence of other conditions detrimental to the finished quality of the job and to repair any damaged paint at no additional cost to the Owner.

Materials or equipment delivered with prime coats shall be touched up as required prior to the application of additional coating(s).

The Contractor shall apply each coating at the rate and in the manner specified by the paint manufacturer. If material has thickened or must be diluted for application by spray gun, the coating shall be built-up to the same thickness achieved with undiluted material. Deficiencies in film thickness shall be corrected by the application of an additional coat(s) of paint. Film thickness shall be determined when dry by the Engineer with a magnetic dry film thickness gauge. The thickness gauge shall be calibrated with test shims.

Where thinning is necessary, only the products of the manufacturer furnishing the paint and for the particular purpose shall be allowed. All thinning shall be done strictly in accordance with the manufacturer's instructions as well as with the full knowledge and approval of the Engineer.

No paint shall be applied when the surrounding air temperature, as measured in the shade, is below 40 degrees F. No paint shall be applied when the temperature of the surface to be painted is below 35 degrees F.

Paint shall not be applied to wet or damp surfaces and shall not be applied in rain, snow, fog or mist or when the relative humidity exceeds 85 percent. No paint shall be applied when it is expected that the relative humidity will exceed 85 percent or that the air temperature will drop below 40 degrees F within 18 hours after the application of the paint. Dew or moisture condensation should be anticipated and if such conditions are prevalent, painting shall be delayed until conditions improve to be certain that the surfaces are dry prior to application of paint. No paint shall be applied when the ambient temperature is less than 5 percent F. above the dewpoint. Further, the day's painting shall be completed well within advance of the probable time of day when condensation will occur, in order to permit the paint film an appreciable drying time prior to the formation of moisture.

Manufacturer's recommended drying time shall be construed to mean "under normal conditions." Where conditions are other than normal because of the weather or because painting must be done in confined spaces, longer drying times shall be necessary. The manufacturer's recommendations for recoating time intervals shall be strictly adhered to.

Adequate ventilation, which will effectively remove solvents, shall be provided for proper drying of paints on interior surfaces. A minimum of 7-consecutive calendar days at 70 degrees F following the application of the final coat on submerged surfaces shall be required before submergence. Longer periods shall be allowed prior to submergence if recommended by the paint manufacturer or if weather conditions require a longer curing time.

3.2 MIXING AND THINNING

Paint shall be thoroughly mixed each time any is withdrawn from the container. Paint containers shall be kept tightly closed except while paint is being withdrawn.

Paint shall be factory mixed to proper consistency and viscosity for hot weather application without thinning. Thinning will be permitted only as necessary to obtain recommended coverage at lower application temperatures. Only thinners approved by the paint manufacturer shall be used. In no case shall the wet film thickness of applied paint be reduced, by addition of paint thinner or otherwise, below the thickness recommended by the paint manufacturer.

3.3 SURFACE PREPARATION

A. GENERAL

Surfaces shall be dry and thoroughly cleaned of foreign materials with all defects filled or removed. All trades employed shall leave the surfaces of their work in such a condition that only minor cleaning, sanding and filling is required of the painting trade for surface preparation.

Hardware, switchplates, machined surfaces, nameplates, lighting fixtures and all other surfaces not to be painted shall be removed or otherwise protected. Drop cloths shall be provided, where necessary, to avoid spotting of surfaces adjacent to the item being painted. Working parts of electrical equipment shall be protected from damage during surface preparation and painting operations.

Hand tool cleaning shall be used when power tool cleaning is not possible. Hand and power tool cleaning shall be in accordance with SSPC Specifications SP-2, SP-3 or SP-11, respectively.

B. FERROUS METAL, GALVANIZED METAL AND HOLLOW METAL SURFACES

The Contractor shall assure that fabrication, welding or burning is completed prior to the sandblasting operation. The Contractor shall chip or grind off flux, splatter, slag or other laminations left from welding. The Contractor shall remove all mill scale. The Contractor shall grind smooth rough welds and other sharp projections.

The Contractor shall power tool or hand clean in accordance with SSPC SP-2 or SSPC SP-3. The Contractor shall apply prime coat on cleaned surfaces within 2 hours of cleaning. The Contractor shall solvent clean galvanized surfaces in accordance with SSPC SP-1.

C. CONCRETE AND CONCRETE BLOCK MASONRY

The Contractor shall allow new concrete and concrete block masonry to cure for a minimum of 28 days and shall verify that the moisture content contained in the concrete is stable and not in motion. The Contractor shall verify by performance of a Wet Matt Test per ASTM D4263. The Contractor shall fill concrete surface cracks and irregularities with Portland cement grout to provide a

uniform surface texture and shall fill concrete block masonry surface with an epoxy block filler as specified. As a minimum, the Contractor shall brush off blast clean surfaces. The Contractor shall prepare the surface as specified elsewhere in these Specifications.

3.4 APPLICATION

A. GENERAL

The Contractor shall mix and apply coatings by brush, roller or spray in accordance with the manufacturer's installation instructions. Spraying equipment shall be inspected and approved in writing by the coating manufacturer. The Contractor shall provide complete coverage's to the mil thickness specified. The thickness specified shall be dry film mil thickness. All paint systems are "to cover." In situations of discrepancy between the manufacturer's square footage coverage rates and mil thickness, mil thickness requirements govern. When color or undercoats show through, the Contractor shall apply additional coats until paint film is of uniform finish and color. The Contractor shall not apply consecutive coats until the Engineer has had an opportunity to observe and approve previous coats.

The Contractor shall apply materials under adequate illumination, shall evenly spread and flow on to provide full, smooth coverage, shall work each application of material into corners, crevices, joints and other difficult to work areas, shall avoid degradation and contamination of blasted surfaces and avoid intercoat contamination, shall clean contaminated surfaces before applying next coat and shall immediately smooth out runs or sags, or remove and recoat entire surfaces. The Contractor shall assure that preceding coats are dry before recoating, shall recoat within the time limits specified by the coating manufacturer and shall allow coated surfaces to cure prior to allowing traffic or other work to proceed.

The Contractor shall coat all aluminum surfaces in contact with dissimilar materials. All fabricated and structural steel shall have prime coat(s) applied in the shop and finish coat(s) applied in the field.

During application of either prime or finish coats, brush coat all weld seams, edges, angles, fasteners and other irregular surfaces to insure a monolithic film, pinhole free surface. Finish coats of paint

shall be uniform in color and sheen without streaks, laps, runs, drips, sags or missed areas.

All submerged or intermittently submerged materials shall have surface preparation and coatings applied prior to installation unless otherwise approved by the Engineer. All pipe, pipe supports, and pipe hangers that will be painted shall have surface preparation and coatings applied prior to installation.

B. PRIME COAT INSTALLATION

The Contractor shall prime all surfaces indicated to be painted, shall touch-up damaged primer coats prior to finish coats and shall assure field-applied coatings are compatible with factory-applied coatings. If coatings are not compatible, and if approved in writing by the Engineer, the Contractor shall apply a 2-mil-thick universal barrier coat recommended by the paint manufacturer prior to applying field coats or completely remove factory coatings and reprime.

The Contractor shall prime ferrous metals bedded in concrete to a minimum of 1 inch below exposed surfaces. The Contractor shall brush or spray bolts, welds, edges and difficult access areas with primer prior to primer application over the entire surface being coated. The Contractor shall backroll concrete, masonry, gypsum board and plaster surfaces with a roller if the primer has been spray applied.

3.5 FIELD QUALITY CONTROL

The Contractor shall be responsible for performing, testing and assuring conformance with all requirements of these Specifications.

The Contractor shall maintain daily records showing:

- Start date of work in each area.
- Date of application for each following coat.
- Moisture content and surface temperature of substrate. Also record weather conditions, ambient air temperature and dew point.
- Provisions utilized to maintain temperature and humidity of work area within paint manufacturer's recommended ranges.

The Contractor shall measure the surface temperature of items to be painted with surface temperature gauges specifically designed for such use. The Contractor shall measure substrate humidity with humidity gauges specifically designed for such use. The Contractor shall measure wet paint with wet film thickness gauges. The Contractor shall measure paint dry film thickness with a Mikrotest gauge calibrated against the National Bureau of Standards "Certified Coating Thickness Calibration Standards." The Engineer may direct measurement of paint thickness at any time during the project to ensure conformance with these Specifications. A sufficient number of dry film thickness measurements shall be made so that there is approximately one measurement for each 100 square feet of surface area painted.

Where a wall or ceiling or other type of surface is disturbed and patched, the Contractor shall repaint entire wall or ceiling. The Contractor shall provide wet paint signs as necessary. The Contractor shall touch up damaged finish coats using the same material as specified for the finish coat.

At the conclusion of all painting activities, Contractor shall submit a painting field test report to the Engineer showing the above information plus results of wet film and dry film thickness tests. Provide four copies of final test report.

3.6 PAINTING SITE

Either shop painting or field painting and surface preparation shall be acceptable when painting work is performed in conformance with this Section, unless the painting is activity specified elsewhere in these Specifications.

3.7 PAINT THICKNESS

All paint thicknesses specified herein are minimum dry film thickness (MDFT). The thickness of paint over metallic surfaces shall be measured with a magnetic thickness gauge; paint thickness over wood or masonry shall vary in accordance with surface texture, but in no case shall the manufacturer's recommended coverage rate be exceeded. The minimum thicknesses given are total coating thickness for the coating specified, including multiple coats of the same material, where applicable.

***** END OF SECTION *****

DIVISION 13
SPECIAL CONSTRUCTION

SECTION 13250

DECOMMISSIONING OF UNDERGROUND FUEL STORAGE TANKS

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section covers the requirements to decommission existing underground fuel storage tanks (USTs) and associated equipment.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
02950	Site Restoration and Rehabilitation

1.3 QUALITY ASSURANCE

A. REGULATIONS

Compliance with all local, state, and federal regulations, and coordination with and notification of the Department of Ecology and any other relevant local, state, or federal agencies, shall be the sole responsibility of the Contractor.

B. UNDERSTANDING OF THE WORK

It shall be the responsibility of the Contractor to understand all components, timelines, and deadlines of the decommissioning process, as required by all regulations, the Department of Ecology, and any other relevant local, state, or federal agencies, including but not limited to, tank cleaning, Ecology notification, site assessment, tank filling, and documentation.

C. PERMITTING AND DOCUMENTATION

Procuring or obtaining all permits, forms, documentation, and reports associated with decommissioning existing fuel tanks and associated appurtenances, as required by all regulations, the Department of Ecology, and any other relevant local, state, or federal agencies, shall be the sole responsibility of the Contractor.

D. CERTIFICATION

All activities associated with decommissioning must be performed by service providers certified in the specific type of work being performed, in accordance with all requirements of the Washington Administrative Code, including but not limited to Chapter 173-360A, and all requirements of the Department of Ecology.

E. POLLUTION CAUSED BY THE CONTRACTOR

In the event that the Contractor's operations cause a release of fuel into the environment or pollution of any kind, the Contractor shall be held liable for the full cost of containment, coordination of the remediation process, and remediation of the release to the satisfaction of all local, state, and federal regulations, the Department of Ecology, and any other relevant local, state, or federal agencies.

1.4 SUBMITTALS

For the Engineer's reference the Contractor shall provide the following submittals in accordance with Section 01300 of these Specifications and as further specified herein. However, the Engineer shall not return reviewed copies of these submittals. Any response, or lack of response, by the Engineer shall not be construed as an endorsement or approval of proposed methods. The submittals listed here are not intended to serve as a list of, or guide for, permitting, approval, notification, or documentation requirements, and neither their inclusion here nor their provision by the Contractor shall relieve the Contractor of any responsibility outlined in these Specifications.

The Contractor shall provide a soil sampling plan, which shall include a written description and sketch of any soil sampling method to be implemented.

The Contractor shall provide a decommissioning plan, which shall include a written description and sketch of the methods and materials which shall be used to decommission and abandon USTs.

The Contractor shall supply copies of all required permits, approval forms, Ecology notification forms, documentation, and reports associated with decommissioning.

Soil sampling plans, decommissioning plan, permits, approval forms, and Ecology notification forms shall be supplied at least five consecutive

calendar days prior to beginning work associated with decommissioning. Forms and reports documenting tank decommissioning shall be provided within thirty consecutive calendar days after decommissioning is complete.

1.5 PROJECT RECORD DOCUMENTS

Record and submit locations and dimensions of any piping, tank components, conduit runs, or other system components which are abandoned in place. Provide dimensioned markups such that buried or otherwise hidden objects may be easily located. Note methods and materials used to fill or seal abandoned system components.

1.6 CONDITION OF EXISTING TANKS AND PIPING

Tanks and piping are not known to have leaked in the past, nor are known to be presently leaking, and it is not anticipated that contaminated soils or groundwater are present.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 GENERAL

Due to the constrained nature of the site and the proximity of the booster station building to the UST, decommission existing 300-gallon diesel UST by abandoning in place in accordance with all local, state, and federal regulations and all requirements of the Department of Ecology and any other relevant local, state, or federal agencies. Maintain a safe travel path for District vehicles and personnel to access all areas of the site at all times.

Remove and wastehaul all tank vent piping and fittings.

Remove and wastehaul all aboveground fuel piping, hoses, and electrical conduit and wiring associated with existing fueling equipment. Any piping or conduit which penetrates walls or ceilings shall be removed where visible and capped at the wall or ceiling. Any piping or conduit which penetrates the floor shall be cut and capped below grade. Repair any penetrations through concrete floor with gravel and concrete as directed by the Engineer.

Remove and wastehaul or abandon in place all below-ground fuel piping and any sections or fragments of tank shell.

All removal and wastehaul or abandonment shall be in compliance with all local, state, and federal regulations and all requirements of the Department of Ecology and any other relevant local, state, or federal agencies.

***** END OF SECTION *****

DIVISION 15
MECHANICAL

SECTION 15066

PIPE AND CONDUIT SUPPORT SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

The work specified in this Section includes pipe and conduit hangers, brackets, and supports. Pipe and conduit support systems shall be furnished complete with all necessary inserts, bolts, nuts, rods, washers, structural attachments, and other accessories as shown on the Plans and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
01800	Testing, Commissioning, and Training
09900	Painting
15050	Piping Systems
15400	Plumbing
16050	Basic Electrical Materials and Methods
16130	Raceways and Boxes

1.3 REFERENCES

All pipe and conduit support materials and methods shall conform to the latest, applicable requirements of documents listed hereafter. In case of conflict between this section and the listed documents, the requirements of this Section shall prevail.

ANSI A13.1	Piping and Piping System
ANSI B31.1	Power Piping
ASME	Boiler and Pressure Vessel Code
ANSI/MSS SP-58	Pipe Hangers and Supports C Materials, Design and Manufacture
ANSI/MSS SP-69	Pipe Hangers and Supports C Selection and Application
SMACNA	Seismic Restraint Manual C Guidelines for Mechanical Systems
UPC	Uniform Plumbing Code

1.4 SUBMITTALS

In accordance with the requirements of Section 01300, submit the following project data prepared by a licensed Professional Engineer:

- A. Manufacturer's technical data for all hangers, brackets, supports and documentation of conformance with appropriate standards and these specifications.
- B. Location of pipe and conduit support, including type of structural and pipe attachments, shown on detail drawings and/or specified under paragraph 1.5 of Section 15050.

PART 2 PRODUCTS

2.1 GENERAL

The Contractor shall design, provide, and install pipe and conduit support systems, which include hangers, brackets, supports, anchors, expansion joints, and structural attachments. The support system shall be pipe rack, trapeze pipe hangers or individual pipe clamps, hangers, supports and structural attachments as specified herein. The support system shall be designed in conjunction with the pipe and conduit to be supported. Seismic restraints shall be provided in accordance with SMACNA Manual as referenced in paragraph 1.3.

In certain locations, pipe supports, anchors, and expansion joints have been indicated on the Plans, but no attempt has been made to indicate every pipe support, anchor, and expansion joint. It shall be the Contractor's responsibility to provide a complete system of pipe and conduit supports. Pipe support schedule under paragraph 2.7 of this Section sets forth minimum requirements for pipe supports.

2.2 PIPE RACKS AND TRAPEZE HANGERS

Pipe and conduit racks and trapeze hangers shall be constructed of galvanized steel channels, rods, posts, post base, clamps, brackets, fittings, and accessories for supporting pipes in equipment and pump rooms. All components for pipe and conduit rack and trapeze shall be Unistrut or equal.

2.3 PIPE CLAMPS AND HANGERS

In areas where pipe racks and trapezes are not used, pipe shall be supported with clamp hangers and stanchion saddle support system. The

clamps and hangers shall be fastened to threaded rods hanging from structural attachments. Pipe supports shall be selected for the size and type of pipe to which they are applied. Strap hangers will not be acceptable. Threaded rods shall have sufficient threading to permit the maximum adjustment available in the support item.

All pipe clamps and hangers, including all accessories, shall be galvanized steel for indoor use and Type 316 stainless steel for outdoor use.

Pipe and conduit clamps and hangers shall be as manufactured by Anvil or equal and shall be as follows:

Type	Pipe Size (In.)	Pipe Material	Anvil Figure
Swivel Ring, Split Type	3/4 to 8	All type	104
Split Clamp	1/2 to 3	All type	138R
Adjustable Ring	1/2 to 6	All type	97
Adjustable Ring	1/2 to 4	Copper	CT-269
Adjustable Clevis	3 to 24	All type	590
Pipe Clamp	3 to 42	All type	216
Socket Clamp	4 to 24	Cast Iron	595
Pipe Stanchion	4 to 24	All Type	63
Stanchion Saddle	4 to 36	All type	259
Adjustable Saddle Support	3 to 36	All type	264
Riser Clamp	2 to 24	All type	40
Adjustable Pipe Roll	6 to 12	Stainless Steel	177, 181, or 274

2.4 STRUCTURAL ATTACHMENTS

Structural attachments shall be concrete insert channels or individual inserts for new concrete, surface-mounted channel or individual inserts for existing concrete or where applicable, steel, roof plate supported attachments in the control building, complete with all accessories required. All structural attachments including all accessories shall be galvanized steel for indoor use and stainless steel for outdoor use, and shall be provided by a single manufacturer. Structural attachments shall be as measured by Unistrut Corporation or approved equal.

2.5 PIPE SUPPORT ATTACHMENTS TO CONCRETE

All pipe support attachment to concrete shall be in adhesive anchors unless noted otherwise.

Products which may be incorporated in the work include, but are not limited to, the following:

- A. HIT RE 500 Injection Adhesive Anchor, Hilti, Inc.
- B. HIT HY 150 Injection adhesive Anchor, Hilti, Inc.
- C. Power-Fast, Powers Fasteners, Inc.

2.6 PROTECTION SADDLES

Protection saddles shall be used for protecting pipe insulation against damage at pipe supports or as shown on the Plans. The nominal thickness of covering shall be the same as that of pipe insulation. The protection saddles shall be curved carbon steel plate and shall be Anvil Figure 160 through Figure 166 or approved equal.

2.7 SPACING

Maximum support spacing shall conform to the following table:

Pipe Size Inches	Pipe Material	Maximum Spacing Feet
1" & Smaller	Iron or Steel	6
	Copper Plastic Tubing	4-1/2 continuous continuous
1-1/4 to 2"	Iron or Steel	8
	Copper or Plastic	5
2-1/2 to 4"	Iron or Steel	10
	Copper or Plastic	6
6 to 8"	Iron or Steel	12
	Plastic	8

PART 3 EXECUTION

3.1 DESIGN

Pipe and conduit support systems shall be designed in accordance with applicable reference standards specified in paragraph 1.3. Pipe and conduit supports shall be designed and selected to withstand seismic loads for IBC 2012 Seismic Design Category D with $S_s=1.34$ and $S_1=0.5g$ and shall adhere to the following conditions:

- A. Weight balance calculations shall be made to determine the required supporting force at each pipe support location and the pipe weight at each equipment location. Design loads for inserts, clamps, and other support items shall not exceed the manufacturer's recommended loads.
- B. Pipe supports shall be able to support the pipe in all conditions of operation. They shall allow free expansion and contraction of the piping, and prevent excessive stress resulting from transferred weight being induced into the pipe or connected equipment. Allow clearances for pipe expansion and contraction.
- C. Wherever possible, pipe attachments for horizontal piping shall be pipe clamps, or as shown on the pipe support detail sheet. Horizontal or vertical pipes should be supported preferably at locations of least vertical movement.
- D. All pipe supports shall provide a means of vertical adjustment after erection.
- E. Where practical, riser pipe shall be supported independently of the connected horizontal piping. Pipe support attachments to the riser piping shall be riser clamps.

3.2 INSTALLATION

Pipe support system shall be installed strictly in accordance with standards and codes referenced in paragraph 1.3 of this Section and piping support system manufacturer and piping manufacturer's recommendations.

In addition, all piping shall be rigidly support and anchored so that there is no movement or visible sagging between supports.

Contact between dissimilar metals, including contact between stainless steel and carbon steel, shall be prevented. Supports for brass or copper pipe or tubing shall be copper-plated. Those portions of pipe supports, which contact other dissimilar metals, shall be rubber or vinyl coated.

Anchorage shall be provided to resist thrust due to temperature changes, changes in diameter or direction, or dead-ending. Anchors shall be located as required to force expansion and contract movement to occur at expansion joints, loops, or elbows, and as required to prevent excessive bending stresses and opening of mechanical couplings. Anchorage for temperature changes shall be centered between elbows and mechanical

joints used as expansion joints. Anchorage for bellows type expansion joints may be located adjacent to the joint.

Pipe supports and expansion joints are not required in buried piping, but concrete thrust blocking or other approved anchorage shall be provided as indicated on the Plans or specified in other sections.

*****END OF SECTION *****

SECTION 15150

DIESEL GENERATOR FUEL SYSTEM

PART 1 GENERAL

1.1 SCOPE

The work specified in this section shall consist of a diesel fuel supply system and associated equipment as shown on the Plans and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
09900	Painting
15066	Pipe and Conduit Support System
16230	Generator Assemblies
Division 16	Electrical

1.3 REFERENCE STANDARDS

- A. The latest Washington State adopted, published edition of a reference shall be applicable.
- B. All Washington State amendments adopted prior to the effective date of this Contract shall be applicable.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:
 - 1. NFPA 30 Flammable and Combustible Liquids Code
 - 2. NFPA 37 Installation and Use of Stationary Combustion Engines and Gas Turbines
 - 3. NFPA 58 Liquefied Petroleum Gas Code
 - 4. NFPA 704 Hazardous Identification System
 - 5. ASME A13.1 Standard for the Identification of Pipes
 - 6. ASME B31 Code for pressure piping

7. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
8. ASTM A312 Standard Specification for Seamless, Welded and Heavily Cold Worked Austenitic Stainless Steel Pipes
9. ASTM 351 Standard Specification for Castings, Austenitic, for Pressure-Containing Parts
10. ASTM B16.3 Malleable Iron Treaded Fittings
11. ASTM B16.5 Steel Pipe Flanges and Flanged Fittings
12. ASTM B16.9 Wrought Steel Buttweld Fittings
13. ASME B31.9 Building Services Piping
14. ASTM A395 Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
15. UL 142 Steel Aboveground Tanks for Flammable And Combustible Liquids
16. International Fire Code (IFC), current edition
17. International Building Code (IBC), current edition
18. International Mechanical Code (IMC), current edition

1.4 QUALITY ASSURANCE

A. MANUFACTURER

Company specializing in manufacturing the Products specified herein with a minimum of three years documented experience.

B. INSTALLER

Company specializing in performing the work of this Section with minimum of three years documented experience.

1.5 SUBMITTALS

A. PRODUCT DATA

Provide product data on pipe materials, pipe fittings, valves, and pipe paint finish.

B. OPERATION AND MAINTENANCE DATA

Submit under provisions of Section 01300.

PART 2 PRODUCTS

2.1 FUEL AND VENT PIPING, ABOVE GROUND

Copper, brass, aluminum or galvanized piping or fittings shall not be used in the fuel piping system.

A. STEEL PIPE

1. Schedule 40 black, Type E or F, Grade A, conforming to ASTM A53.

2. Fittings

Malleable iron, class 150, NPT, conforming to ASME B16.3.

B. STAINLESS STEEL PIPE

1. Schedule 40 stainless steel, Type 304L, conforming to ASTM A312.

2. Fittings

Stainless steel, class 150, NPT, conforming to ASTM A351.

C. THREAD SEALANT

Provide high temperature thread sealant with PTFE for tapered pipe threads.

1. Temperature Range: -65 degrees F to 400 degrees F

2. Chemical Resistance

Gasoline, oil, water, glycol, hydraulic fluid, Freon, transmission fluid, brake fluid.

3. Manufacturer

High Temperature Sealant with PTFE, Permatex or equal.

2.2 FUEL PIPING VALVES AND EQUIPMENT

A. BALL VALVES

Provide a lockable, full port, ball valve for material isolation. Install at the fuel tank and prior to the generator's flexible connector.

1. Construction: Stainless steel body and ball with Teflon packing, seat and seals
2. Handle: Lockable, stainless steel with PVC grip
3. Cold Working Pressure: 1,000 psi, non-shock
4. Connection: NPT
5. Temperature: -20 – 350 degrees Fahrenheit
6. Manufacturer and Model and Model: Morrison Bros., 691BSS or equal

B. CHECK VALVES

Provide an inline check valve compatible for use with diesel fuel.

1. Construction: 304/316 stainless steel
2. Maximum Working Pressure: 200 psi
3. Connection: NPT
4. Working Temperature: -40 to 300 degrees Fahrenheit
5. Manufacturer and Model: Morrison Bros., 958 or equal

C. DIELECTRIC-INSULATED UNIONS

Provide industrial dielectric o-ring union where dissimilar metals are joined. The union shall be compatible with diesel fuel.

1. Construction: The connection pieces shall be same material as the material it is joining to.
 - a. O-ring: Viton
2. Connection Configuration: NPT x NPT
3. Manufacturer and Model: Hart 3,000 psi Dielectric Union or equal.

2.3 PAINTING

Paint all piping in accordance with specification Section 09900 - Painting. Diesel fuel pipe shall be Brown in color.

2.4 PIPE IDENTIFICATION

A. FUEL PIPE

Provide self sticking, adhesive-backed, vinyl pipe marker labeled "DIESEL" in white lettering on Brown background in accordance with ANSI/ASME A13.1-2007. The label shall indicate flow with arrows at both ends of the label; be visible from the point of normal approach; placed near valves, flanges and changes in pipe direction; placed both sides of ceiling, wall or floor penetrations; placed at an line entry or reentry point; placed on straight pipe runs every 20 feet.

B. VALVES

Label valves and actuators utilizing hanging tags to indicate their function and normal position.

1. Ball Valve
 - a. Function: Material Isolation
 - b. Normal Position: Open

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

Deliver fuel system components to their final locations in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is safe from such hazards. Field repair of material or equipment made defective by improper storage or site construction damage by other trades may be cause for rejection of installation.

3.2 INSTALLATION

Piping systems shall be supported and protected against physical damage, including damage from stresses arising from settlement, vibration, expansion, or contraction.

All piping shall be installed, examined, inspected and tested in accordance with the requirements of ASME 31.9, *Building Services Piping*, current edition, and the requirements of this specification and the engineering Plans. All pipe shall be carefully placed and supported at the proper lines and grades and where possible. Piping runs shown on the Plans shall be followed as closely as possible, except for minor adjustments to avoid architectural and structural features. The Owner shall approve major re-routing if required.

All equipment shall be installed in strict accordance with manufacturer's recommendations and/or specifications, authority having jurisdiction and best commercial trade practice. Any special tools required for laying, jointing, cutting, etc., shall be supplied and properly used. All pipes, valves, and equipment shall be kept thoroughly clean until acceptance of completed work, and shall conform accurately to lines and grades given. At all times during pipe laying operations, the trench shall be kept free of water either by pumping, bailing or drainage. Seal end of line with a water tight plug or cover when pipe is not being laid.

A. ABOVE GRADE PIPING

Unless shown otherwise, piping shall be installed parallel to building lines, plumb and level. Piping shall be installed without springing or forcing. Joints between steel pipe and fittings shall be sealed liquid tight and threaded.

All pipe shall be cut square, reamed and chamfered and be free of all burrs and obstructions. Pipe ends shall have full-bore openings and shall not be undercut.

Threads for threaded joint piping shall be neatly cut with sharp tools and jointing procedure shall conform to the best practice. All threaded pipe shall be screwed together with an application of approved thread sealant that is applied to the male threads only. Once a joint has been tightened, it shall not be backed off unless threads are recleaned and new compound applied. This application shall be neatly made; with all compound and dirt thoroughly wiped off outside of every joint.

Pipe shall be bent in accordance with ASME B31.9.

Unions shall be installed in all threaded joint piping to facilitate removal of pipe sections for maintenance or repair in accordance with best trade practice. Unions or flexible couplings shall be installed where shown on the Plans and at all equipment to facilitate removal of the equipment. Where two dissimilar metals join a dielectric union shall be installed to prevent galvanic corrosion where shown on the Plans and where the materials in question have greater than a 0.15 V difference based on the anodic index.

Pipe passing through concrete walls or slabs shall be installed through a steel sleeve with a minimum size of two pipe diameters larger than the carrier pipe. The sleeve shall be free of all dirt and grease and thoroughly cleaned to insure a tight bond with the concrete.

3.3 TESTING

A. PIPING

The pressure test shall be witnessed by the Owner. The Owner shall be notified within 15 days prior to testing. The Contractor shall provide all equipment and labor necessary to perform all testing required herein, the costs to be included in the lump sum bid price. All piping systems shall be tested to demonstrate leak tightness prior to acceptance. Testing shall be done pneumatically to 5 psi. The test pressure shall be maintained while a complete visual inspection of all joints and connections is conducted. There shall be no leakage or permanent distortion caused by the pressure testing. Care shall be exercised to ensure that these pressures are

not applied to the storage tank. In no case shall the test pressure be less than a gauge pressure of 5 psi measured at the highest point of the system and in no case shall the test pressure be maintained less than 60 minutes. All leaks shall be repaired or defective material replaced and the test repeated as piping is airtight. The Contractor shall be responsible for repair of any damage resulting from or caused by pressure testing.

After compliance with test requirements and approval of the Owner, the field painting, where required, may be started. All pressure testing shall be done prior to any finish painting or pipe insulating.

B. FLUSHING

After fuel piping is installed the fuel piping system shall be thoroughly flushed with diesel until all debris is removed and diesel is clear. Contractor shall legally dispose of flush diesel.

***** END OF SECTION *****

SECTION 15550

GENERATOR ENGINE EXHAUST SYSTEM

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section shall consist of generator engine exhaust piping, silencer, insulation and accessory equipment as shown on the Plans, and as further specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
09900	Painting
15066	Pipe and Conduit Support System
16230	Generator Assemblies

1.3 REFERENCES

- A. The latest Washington State adopted, published edition of a reference shall be applicable.
- B. All Washington Stated amendments adopted prior to the effective date of this Contract shall be applicable.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:
 - 1. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - 2. NFPA 37 Installation and Use of Stationary Combustion Engines and Gas Turbines
 - 3. International Fire Code (IFC), current edition
 - 4. International Building Code (IBC), current edition
 - 5. International Mechanical Code (IMC), current edition

1.4 SUBMITTALS

Submit under provisions of Section 01300.

A. PRODUCT DATA

Provide data on pipe materials, pipe fittings, silencer, thimble, roof curb, blanket insulation, and accessories.

B. OPERATION AND MAINTENANCE DATA

Provide information to be included in the operation and maintenance equipment manuals specified in Section 01300 and Section 11000.

C. WELDER CERTIFICATION

Provide welders certification in accordance with American Welding Society or American Society of Mechanical Engineers.

1.5 QUALITY ASSURANCE

A. STEEL SUPPORT WELDING

Qualify processes and operators according to AWS D1.1, "Structural Welding Code-Steel"

B. STEEL PIPE WELDING

Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications"

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping"
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

PART 2 PRODUCTS

2.1 EXHAUST SYSTEM

A. LOW PROFILE SILENCER

Provide a heavy duty silencer for standby generator application.

1. Type: Critical grade.
2. Construction: Heavy duty, Type 316 stainless steel
3. Connection: 150# ANSI pattern steel flange
4. Finish: Type 316 stainless steel
5. Style: bottom inlet, end outlet
6. Options: Top-mounted brackets
7. Manufacturer: GT Exhaust Systems, Harco Manufacturing, or equal.
8. Weight of Silencer: Less than or equal to 250 pounds
9. Size of Silencer: Maximum height of 16-inches (flange to top). Height must be compatible with exhaust flange of generator and booster station roof. Maximum length of 42-inches. Length must be compatible with available distance between generator and booster station wall. Proposed design is based off GT Exhaust 501-C2-51-04 Slimline Silencer. Adjustments to the design including generator location and required exhaust duct, based on alternative models provided are the responsibility of the Contractor. Any and all additional costs incurred for review and/or redesign of the system shall be the sole responsibility of the Contractor.
10. Insertion losses: At a minimum the reduction achieved shall be as shown in the following table.

Frequency, Hz	63	125	250	500	1,000	2,000	4,000	8,000
Insertion Losses, dBA	26	34	40	41	40	38	36	37

B. EXHAUST PIPE

1. Type 316 stainless steel, Schedule 40, butt-weld.
2. Fittings shall be Type 316 stainless steel, butt-weld, conforming to ASME B16.9 and ASTM A234. Grooved couplings are not allowed for generator exhaust piping.

C. FLANGE

Type 316 stainless steel, full bore weld neck, raised face, class 150, conforming to ASME B16.5

D. FLEXIBLE CONNECTOR

Connection of the exhaust pipe to the generator engine shall be made by a flexible connection to allow for vibration.

1. Material: Type 321 stainless steel, corrugated
2. Length: 18 inches, minimum
3. Connection: ANSI pattern flange.
4. Size: 3-inch diameter

E. HIGH TEMPERATURE GASKET

Provide gasket of high temperature sealing material compatible with hot diesel exhaust.

1. Material: Non asbestos Vermiculite Ceramic bonded with nitrile rubber
2. Thickness: 1/8 inch
3. Temperature Rating: 1,200 degrees Fahrenheit
4. Certification: ANSI B16.21
5. Manufacturer: Gardico 956G or equal

2.2 EXHAUST SYSTEM ACCESSORIES

A. BLANKET INSULATION

The insulation blanket shall be asbestos free and fabricated using a coated fiberglass cloth outer jacket, a minimum 1-inch-thick insulation layer of glass fiber and a flexible non-corrosive inner liner. The insulation blanket shall be factory sewn to the required configuration, to ensure a secure and complete fit. The insulation shall not decay, nor sustain mold or vermin.

1. Insulation Material: The insulation material shall be Type E fiberglass, noncombustible
2. Insulation Density: 12 lb/cu. Ft.
3. Jacket Material: Silicone impregnated fiberglass cloth
4. Inner Liner: Stainless steel
5. Sewing Tread Material: Teflon-coated fiberglass or Kevlar glass
6. Rivets: Stainless steel
7. Temperature Rating: 1,200 degrees Fahrenheit
8. Certifications: UL listed, conform to specifications MIL-I-16411, MIL-I-24244 and ASTM C-1086-88.
9. Manufacturer: Firwin Corp. or equal.

B. SUPPORTS

Provide supports in accordance with Specification Section 15066 of these Specifications.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

Deliver exhaust system components to their final locations in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is safe from such hazards and weather

exposure. Field repair of material or equipment made defective by improper storage or site construction damage may be cause for rejection of installation.

3.2 INSTALLATION

Provide all accessories necessary for proper operation as specified or required for the application. All exhaust system components shall be installed in a manner and location as shown on the Plans or as required for the application and in accordance with manufacturer's instructions. Support all equipment where necessary. In case of conflict between these specifications and a governing code, the more stringent standard shall prevail.

Piping system shall be supported and protected against physical damage, including damage from stresses arising from settlement, vibration, expansion, or contraction.

Exhaust piping shall be sloped away from the generator. A drip leg shall be installed in the lowest piping point. All pipe shall be carefully placed and supported at the proper lines and grades and where possible shall be sloped to permit complete drainage. Piping runs shown on the Plans shall be followed as closely as possible, except for minor adjustments to avoid architectural and structural features. The Owner shall approve major relocations if required.

All pipe shall be installed in strict accordance with manufacturer's recommendations and/or specifications, and best commercial trade practice. Any special tools required for laying, jointing, cutting, etc., shall be supplied and properly used. All pipe shall be kept thoroughly clean until acceptance of completed work, and shall conform accurately to lines and grades given. At all times during pipe laying operations keep trench free of water either by pumping, bailing or drainage. Seal end of line with a water tight plug when pipe is not being laid.

A. PIPING

Joints between steel pipe and fittings shall be welded or flanged. Piping shall be installed without springing or forcing.

All pipe flanges shall be set level, plumb, and aligned. All flanged fittings shall be true and perpendicular to the axis of the pipe. All bolt holes in flanges shall straddle vertical centerline of pipes. All flanged connections shall be bolted together with an approved high temperature gasket material between the flanged connections.

All pipe shall be cut square, reamed and chamfered and be free of all burrs and obstructions. Pipe ends shall have full-bore openings and shall not be undercut.

All welding shall be by the shielded arc, inert gas, MIG or TIG method. Procedures are in accordance with ANSI B31. Filler wire shall be added to all welds to provide for a cross section and weld metal equal to or greater than the parent metal. Butt welds shall have full penetration to the interior surface and gas shielding shall be provided to the interior and exterior of the joint mechanically bevel pipe ends.

Interior weld beads shall be smooth, evenly distributed with an interior projection not exceeding 1/16 of an inch beyond the ID of the air header or fittings.

The outside welds shall be wire brushed. Brushes shall be of stainless steel and used only on stainless steel.

Where equipment drain connections are provided, they shall be valved, with the discharge pipe carried to the nearest floor drain, drain trench or sump. Where no receptacle for drain exists, drain valves shall be piped to 1 inch above the floor. Drain piping and valve materials shall conform to the requirements of the system served.

B. SILENCER

The silencer shall be installed at a slope to allow condensate to reach the drain valve. Provide touch up painting of the silencer where scratches have exposed the layer under the factory applied finish. The touch-up painting shall be either provided by the manufacturer or furnished by the contractor to match the factory applied finish.

C. INSULATION

Insulate the entire exhaust system with high temperature blanket insulation. Install high-temperature insulation blankets made to fit the installation allowing for hangers and clearances. Fasten the outer jacket laced up with stainless steel soft-tempered lacing wire to secure each blanket. The exhaust system consists of the silencer and all associated rigid piping and fittings. Insulation shall not be placed on the flexible connector.

3.3 TESTING

All piping systems will be tested to demonstrate leak tightness prior to acceptance. The Contractor shall provide all equipment and labor necessary to perform all testing required herein.

All leaks shall be repaired and all defective material replaced and the test repeated as directed by the Owner. The Contractor shall be responsible for repair of any damage resulting from or caused by leak testing. After compliance with test requirements and approval of the Owner, the field painting, where required, may be started. All pressure testing shall be done prior to any finish painting or pipe insulating.

***** END OF SECTION *****

DIVISION 16
ELECTRICAL

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the requirements and methods for furnishing and installing the basic electrical materials, and other associated items as shown on the Plans, and as further specified herein.

1.2 RELATED WORKS SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
01800	Testing, Commissioning, and Training
02300	Site Earthwork
Division 3	Concrete
09900	Painting
11000	Equipment General Provisions
Division 15	Mechanical
Division 16	Electrical

1.3 DEFINITIONS

A. CONCEALED AREAS

Locations that are underground, within walls, or within other areas that do not allow full entry of personnel are considered concealed. Concealed areas are not exposed (see EXPOSED AREAS) or accessible.

B. CONTROL PANELS

Control Panels shall be defined as enclosures that contain electrical devices capable of controlling, altering, indicating or displaying the function or conditions of electrical circuits. Unlike junction boxes, Control Panels are not just used for the redirection or reconnection of electrical circuits.

C. CONVENIENCE RECEPTACLES

120 Vac general-purpose receptacles that are not dedicated to a specific function or piece of equipment. Receptacles dedicated to

computers, heat tracing, fans, louvers, and etc., are not considered convenience receptacles.

D. DAMP AREAS

Damp areas are considered wet (see WET AREAS).

E. DEDICATED RECEPTACLES

Dedicated receptacles are provided for a specific receptacle load such as computers, heat tracing, fans, louvers, metering pumps, sump pumps, and etc. Dedicated receptacles are not intended for general use.

F. DRY AREAS

Locations not normally subject to dampness or wetness. A location classified as dry may be temporarily subjected to dampness or wetness, as in the case of a building under construction (see FINISHED AREAS).

Rooms containing process water, chemical piping, or related equipment are not considered DRY. Areas that are not considered DRY are considered WET.

G. EXPOSED AREAS

Locations that are visible, outdoors, or exposed to a process or room environment. Exposed areas are not concealed (see CONCEALED AREAS).

H. HAZARDOUS AREAS

Class I, Divisions 1, and 2; Class II, Divisions 1 and 2; Class III, Divisions 1 and 2 locations where fire or explosion hazards may exist due to flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings (reference National Electrical Code, Article 500).

I. INDOOR AREAS

Confined locations where the equipment is normally protected from wind, dust, rain, snow, and other natural elements. INDOOR areas are not the same as DRY areas.

J. LEGALLY REQUIRED STANDBY SYSTEMS

Those systems required and so classed as legally required to have standby power by Government requirements. All projects have a generator or receptacle for a generator are considered to be a legally required standby system unless stated otherwise.

K. OUTDOOR AREAS

Locations where the equipment is normally exposed, or partially exposed, to weather in the form of wind, dust, rain, snow, and other natural elements.

L. PROCESS AREAS

Process areas are those areas that are directly exposed to process moisture, or that may be subjected to moisture in the event of a process leak or failure. They typically include pump rooms, chemical rooms, and direct process-exposure areas such as clearwells, open filters, and reservoirs. Process areas are considered WET.

M. SHOP FABRICATED

Manufactured or assembled equipment for which a UL test procedure has not been established.

N. SOFT START MOTOR CONTROLLERS

See SOLID STATE MOTOR CONTROLLERS in this Section.

O. SOLID STATE MOTOR CONTROLLERS

Solid State motor controllers provide an electronically controlled acceleration and deceleration of AC squirrel-cage induction motors. Once the motor has reached full speed, the electronics are switched off and replaced with a motor drive contactor that connects the motor directly to line power, thus assuring continuous full voltage to the motor. Solid State motor controllers are also referred to Soft Start motor controllers.

Solid State motor controllers do not alter the sine wave *frequency* to the motor; instead they alter the portion of the sine wave that reaches the motor. This controls the amount of power sent to the motor and affects the motor's ability to create torque. The

electronic Solid State control is only used during acceleration and deceleration. During acceleration the controller switches the waveform from 0 up to 100 percent (full voltage) and during deceleration switches the waveform from 100 down to 0 percent (no voltage).

P. VIBRATING EQUIPMENT

Equipment that is subject to vibration under normal operating conditions, such as motors, transformers, electrically operated valves, etc.

Q. WET AREAS

Locations outdoors, underground, directly or indirectly exposed to the process, in concrete slabs or masonry in direct contact with the earth, or in any other way subject to saturation with water or other liquids.

1.4 REFERENCES

Unless otherwise noted, the requirements of the following code-making authorities and standard organizations apply:

<u>References</u>	<u>Title</u>
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ASTM A36	Specification for Structural Steel
ETL	Electrical Testing Laboratories, Inc.
FM	Factory Mutual System
ICEAO	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society of North America
ISA	Instrument Society of America
JIC	Joint Industrial Council
JIC EMP-1	Mass production Equipment
LPI	Light Protection Institute
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NEMA ICS-1	General Standards for Industrial Control and Systems
NEMA ICS-2	Industrial Control Devices, Controllers and Assemblies
NEMA ICS-6	Enclosures for Industrial Controls and Systems
NFPA	National Fire Protection Association

NRTL	National Recognized Testing Laboratory
OSHA	Occupational, Health, and Safety Administration
UL	Underwriters Laboratories, Inc.
UL 508	Safety Industrial Control Equipment
UL 698	Industrial Control Equipment for Use in Hazardous Locations
WAC 296-46B	Washington Administrative Code, Electrical Safety Standards, Administration, and Installation

In case of conflict or disagreement between codes, standards, laws, ordinances, rules, regulations, plans, and specifications, the more stringent condition shall govern.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Prior to submittal of shop plans, coordinate all electrical equipment, particularly motor control equipment, process and control panels, and instrumentation, with related manufacturers and with other applicable equipment and systems specified in other divisions of the Specifications.
- C. Provide submittals in the following manner:
 - 1. Organize the submittals by CSI code type.
 - 2. Clearly show the Tag Number associated with each submittal within each CSI grouping.
 - 3. Include non-tagged devices such as grounding systems, conduits, wireway, ductbank details, wire, cable, boxes, fittings, switches and receptacles.
 - 4. Clearly show the specific part, part number, order code, etc. associated with the device. Use pointers, highlights, circles, etc. to clearly identify the specific part.
 - 5. Submit on distribution equipment, including but not limited to: Unit substations, Medium voltage switching equipment, motor control centers and control equipment, low voltage switchboards, safety switches, dry-type (specialty) transformers, panelboards, and grounding.
 - 6. Submit on generators and automatic transfer switches.

7. Submit on lamps, lighting, site lighting, and wiring devices.
- D. Provide manufacturer's product technical data including, but not limited to:
1. Manufacturer's name, address, and contact number.
 2. Manufacturer's product descriptive bulletin.
 3. Nameplate data, current, voltage, load, impedance, and other electrical data pertinent to the Project and necessary to assure compliance with the Specifications and Plans.
- E. Provide elementary wiring diagrams for the electrical control systems showing the wiring of electrical control items, such as starters, control systems, interlocks, switches, and relays as they apply to this Contract.
- F. Provide schematic interconnection diagrams.
- G. Use diagrams and symbols in shop plans, which conform to JIC Electrical Standards for Industrial Equipment and/or NEMA, ICS, ANSI, and IEEE standards, latest revisions. Prepare plans on 22" x 34", or ANSI size A, B, or D in a format similar to the Contract Documents or other nationally recognized drawing standard.
- H. Clearly, indicate on submittals that the equipment or material is NRTL listed or is constructed of listed or recognized components. Where a NRTL standard has not been established, clearly identify that no NRTL standard exists for that equipment.
- I. OPERATION AND MAINTENANCE MANUALS

Manuals for the electrical system shall consist of 3-ringed, expandable metal hinge binders labeled with the job name and the Contractor's name.

1. Provide tab dividers for each major type of equipment. Each divider shall contain detailed information, plans, diagrams, description of operation, and instructions for installing, operating, and maintaining the equipment installed in Division 16.

2. Provide a table of contents listing each tab divided section and its contents.
 3. In each section, compile a spare parts list and supplier index.
 4. Assemble records of all tests, measurements, and calibration settings made for each device.
- J. Upon completion of the work, provide Record (“As Built”) Plans. Fold, punch, and insert these records into the manual after they are reviewed by the Engineer by folding and punching 11" x 17" or smaller plans and folding larger sheets, and placing in plastic sleeves in manual.

1.6 SYSTEM DESCRIPTION

- A. Provide the labor, materials, and equipment necessary to furnish, install, and place into operation complete power, lighting, control, alarm, communications, and instrumentation electrical system of this Contract as shown on the Plans or Specifications herein.
- B. Provide a functioning system(s) in compliance with manufacturer's instructions, performance requirements as specified or indicated, and modifications resulting from reviewed shop plans and field coordinated plans.
- C. Provide complete wiring and controls for all equipment specified under other divisions and that comply with Division 16.
 1. Connect motors, controls, meters, and any other electrical device installed or provided as part of the project.
- D. Pay and make arrangements for necessary permits, licenses, and inspections.

1.7 QUALITY ASSURANCE

A. TESTING AGENCY QUALIFICATIONS

A “Nationally Recognized Testing Laboratory” (NRTL) as defined in OSHA Regulation 1910.7, or a full member company of the InterNational Electrical Testing Association (NETA).

1. Testing Agency Field Supervision: Use persons currently certified by NETA or the National Institute for Certification in Engineering Technologies, or equal, to supervise onsite testing specified in Part 3.
- B. Comply with NFPA 70 (NEC) for components and installation.
- C. LISTING AND LABELING

Provide products specified in this Section that are listed and labeled.

1. The Terms “Listed and Labeled:” As defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A NRTL as defined in OSHA Regulation 1910.7.

1.8 DELIVERY, STORAGE AND HANDLING

See Section 01600. Ensure that equipment is not used as steps, ladders, scaffolds, platforms, or for storage – either inside or on top of enclosures. Protect nameplates on electrical equipment from being defaced. Repair or replace damaged, corroded, and rejected items at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Refer to individual Division 16 sections.
 1. Similar equipment shall be provided by only one manufacturer throughout the project unless otherwise noted in the Specifications.
- B. Submit requests for substitution in accordance with Section 01300.
- C. Trade names and catalog numbers may be used in the Plans or Specifications to establish quality standards and basis of design:
 1. Other listed manufacturers in the applicable specification sections with equal equipment may be acceptable.

2.2 GENERAL PRODUCT REQUIREMENTS

- A. Except as otherwise indicated, provide new materials and equipment, which are standard products of manufacturers, regularly engaged in production of such equipment. Provide material or equipment approved and labeled for the purpose for which it is to be used by NRTL or other organizations acceptable to the State of Washington Department of Labor and Industries.
- B. Where voltage, current, power, temperature or other ratings are specified that do not correspond to standard ratings of the manufacturer selected by the Contractor, furnish the next rating level which is more conservative or increases the capacity of the device or material in question.
- C. Furnish materials, devices, and equipment that are non-corrosive or coat them in a manner that renders them non-corrosive and acceptable to the Engineer. Do not provide materials, which contain polychlorinated biphenyls, asbestos, or other hazardous or detrimental materials. Do not install materials in a location or construction manner that produces galvanic action or do not install material combinations with corroding or eroding action.
- D. Where changes in the work, or substitutions in material are proposed, ensure that sizes, weights, openings, etc., are provided that do not require changes in the work outside this Division.
- E. All terminals shall be rated 75 degrees C (minimum).

2.3 FABRICATION

- A. When equipment is shop fabricated specifically for this Project, use electrical devices and enclosures, which are NRTL, listed and labeled or recognized.
- B. SHOP OR FACTORY FINISHES
 - 1. See Division 11 and Section 09900.
 - 2. Interiors of other painted electrical equipment shall be either white or light gray.
- C. Fabricate equipment or devices in the field equivalent in every respect to manufactured items used for the same purpose. Where

cutting, drilling, grinding, etc., is done to galvanize or painted metal, regalvanize, or paint to match original finish.

2.4 SUPPORTING DEVICES

A. Channel and angle support systems, hangers, anchors, sleeves, brackets, fabricated items, and fasteners are designed to provide secure support from the building structure for electrical components.

1. Material

Steel, except as otherwise indicated, protected from corrosion with zinc coating, cadmium plating, or with treatment of equivalent corrosion resistance using approved alternative finish or inherent material characteristics.

2. Metal Items for Use Outdoors or in Damp Locations

Hot-dip galvanized steel, or stainless steel, except as otherwise indicated.

B. ANCHORS

Cadmium plated or galvanized steel in dry areas; stainless steel or hot dipped galvanized steel in wet areas.

1. Lag screws or Type A tapping screws for wood.

2. Rockwell "well-nut" for light loads in masonry.

3. Thru-bolt with fender washers for heavy loads in masonry.

4. Toggle bolts with springhead for hollow partitions.

5. Self-drilling anchors with threaded studs for concrete.

6. Clamps or U-bolts for structural steel.

7. Self-drilling anchors with extension rods for hollow tile over concrete.

C. SHEET-METAL SLEEVES

0.0276 of an inch or heavier galvanized sheet steel, round tube, closed with welded longitudinal joint.

D. PIPE SLEEVES

ASTM A53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

2.5 ELECTRICAL IDENTIFICATION

A. MANUFACTURER'S STANDARD PRODUCTS

Where more than one type is listed for a specified application, selection is Installer's option but provide single type for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and Specifications.

B. COLORED ADHESIVE MARKING TAPE FOR RACEWAYS, WIRES, AND CABLES

Self-adhesive vinyl tape, not less than 3 mils thick by 1 inch wide.

C. UNDERGROUND LINE WARNING TAPE

Provide bright-colored, vinyl tape not less than 3 mils thick by 6 inches wide compounded for direct-burial service with permanent and continuous print.

D. TAPE MARKERS

Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

E. COLOR-CODING CABLE TIES

Type 6/6 nylon, self-locking type. Colors to suit coding scheme.

F. FASTENERS FOR PLASTIC-LAMINATED AND METAL SIGNS

Self-tapping stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

G. FLASH PROTECTION WARNING

Provide Arc Flash Warning Label on all equipment as required by 110.16 NEC (2014). The label is to contain the following text:

WARNING or DANGER
Arc Flash Hazard!
Follow requirements in NFPA
70E for safe work practices and
appropriate PPE. Failure to
comply can result in death or
injury.

2.6 TOUCHUP PAINT

Use touchup paint on equipment provided by equipment manufacturer and select color to match existing equipment finish.

A. FOR NON-EQUIPMENT SURFACES

Matching type and color of undamaged, existing adjacent finish.

B. FOR GALVANIZED SURFACES

Zinc-rich paint recommended by equipment manufacturer.

PART 3 EXECUTION

3.1 ELECTRICAL SUPPORTING METHODS

A. WET AREAS

1. For pullboxes and equipment vaults, reference Specification Section 16130.
2. For wet areas which are not pullboxes or equipment vaults, hot-dip galvanized materials, stainless steel materials, or nonmetallic, U-channel system components unless otherwise noted on the Plans.

B. DRY AREAS

Hot-dip galvanized materials unless otherwise noted on the Plans.

C. METHODS

Support raceway, equipment, and devices from framing members or building structure with sufficient clearance for maintaining and servicing. Provide backing plates, and/or framing material to support equipment, devices, and materials, which are located between the building or facility structure-framing members.

3.2 RECORDS

- A. Maintain and annotate on the job at all times a separate set of Record Drawings in accordance with the General Conditions. Show changes from the Contract Documents, routing of hidden raceways, actual fixture and equipment locations, equipment sizes and dimensions and building outline changes. At the end of the Project, provide the Engineer a complete set of Plans marked in red pencil in a manner consistent with the Contract Plans, indicating the changes made on the job.
- B. Record voltage, current, and megohmmeter and ground ohmic resistance test measurements made on the electrical work, the trip units, fuses, and overload relay elements installed in the equipment and the setting of all pressure, flow, level, etc., control devices. When the Project is completed and operating, turn over these records to the Owner.
- C. Equipment and raceways installed under this contract for future work shall be dimensioned on the Record Drawings.

3.3 COORDINATION

- A. Arrange for chases, slots, and openings in building structure during progress of construction to allow for electrical installations. Obtain approval from structural Engineer for penetration of structural components prior to penetrating the component.
- B. Coordinate installation of supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the work. Coordinate installation of large equipment requiring positioning prior to closing in the building.

- D. Coordinate the location of motors, switches, panel connections, and other points of connection with the equipment manufacturers or vendors prior to conduit installation. Route circuits to the actual connection point. Even if removal and reinstallation of building materials is necessary, remove and reinstall conduit, outlet boxes, and other electrical connections, if initial electrical connections are not made to the appropriate equipment location.
- E. Coordinate and schedule connecting electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
- F. Coordinate and verify work under Division 16 with work under other Divisions, cooperate in locating equipment to avoid interference with work of others, and plan work to harmonize with the work of other trades so that all work may proceed as expeditiously as possible. Coordinate the installing of built-in work, attaching items to buildings, and cutting and patching. Coordinate connecting electrical circuits to components furnished under other Divisions. (Portions of the electrical design are based upon the equipment specified in other Divisions.) No extras are allowed because of moving work required to avoid interference with work of other Contractors.
- G. Coordinate the interruption of electrical systems to any part of the facility in use by the Owner at least 3 working days before interruption of the system.
- H. Coordinate installing electrical identification after completion of finishing work where identification is applied to field-finished surfaces.
- I. Where changes in the work, or substitutions in material are proposed, ensure that sizes, weights, openings, etc., are provided that do not require changes in the work outside this Division.
- J. Legally required standby system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent devices per NEC 701.18. Do an engineering coordination study of all overcurrent devices and provide copies for review by the Engineer and retention by Owner.

3.4 INSTALLATION

A. ENCLOSURES FOR USE WITH ELECTRICAL EQUIPMENT

Unless specifically called out otherwise on the Plans, electrical enclosures shall meet the following specification:

1. Dry Areas

NEMA 1.

2. Wet Areas

a. Indoors

NEMA 3R with HVAC equipment.

NEMA 4 where the enclosure will be subjected to splashing water or hose-directed water.

NEMA 12 where the enclosure will not be subjected to splashing water or hose-directed water.

b. Outdoors

NEMA 3R where the enclosure will not be subjected to splashing water, hose-directed water, or windblown dust.

NEMA 4 where the equipment is not HVAC and where the enclosure will be subjected to splashing water, hose-directed water, or windblown dust.

3. Corrosive Locations

NEMA 4X.

4. Exceptions

a. As otherwise indicated on the Plans.

b. As modified in other Division 16 sections.

5. Standards

- a. NEMA ICS-6, Enclosures for Industrial Controls and Systems.
- b. UL 508, Rainproof Enclosures.
- c. UL 698, Industrial Control Equipment for use in Hazardous Locations.

B. WORKMANSHIP

Install the equipment and materials in a neat and workmanlike manner employing workers skilled in the particular trade and in accordance with the manufacturer's instructions, the National Electric Code, National Electric Safety Code, applicable local regulations, ordinances, and industry standards. A person in charge at the site shall maintain adequate supervision of the work under this division when necessary for coordination with other work.

C. SELF-SUPPORTED EQUIPMENT

Install self-supporting equipment in a level and plumb manner, shimming with full width stainless steel shims, as necessary. Bolt units to the floor with stainless steel expansion anchors and bolts, or weld units to embedded steel channels. Floor or pad shall be level within plus or minus 1/8 of an inch in a square yard before installing equipment. Grout or caulk enclosure to floor or pad. Provide bushings on conduits entering from above or at the side. For conduits entering from below, install grounded insulating bushings bonded to the ground bus or pad.

Install concrete pads and bases according to requirements of Section 03300.

Provide concrete foundations or pads required for electrical equipment as indicated or specified.

D. MOUNTING HEIGHT

Install components and equipment to provide the maximum possible headroom where mounting heights or other location criteria are not indicated.

E. ACCESSIBILITY

Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, while minimizing interference with other installations.

F. EQUIPMENT ORIENTATION

Install items parallel and/or perpendicular to other building systems and components, except where otherwise indicated.

G. EQUIPMENT MOUNTED ENCLOSURES

Attach enclosures mounted on equipment with machine screws or clamps as required. Do not drill equipment frames or sheets without permission of supplier/manufacturer or the Engineer.

Do not mount safety switches and external equipment to other equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.

H. COORDINATION

Give right of way to raceways and piping systems installed at a required slope.

I. WALL MOUNTED ENCLOSURES

Stand equipment off wall surfaces a minimum of 1/4 of an inch where enclosures are mounted on walls in WET AREAS with neoprene or plastic shim washers. See also Section 3.4 M., Penetrations.

J. MISCELLANEOUS SUPPORTS

Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices, except where components are mounted directly to a structural member of adequate strength.

K. SLEEVES

Install for cable and raceway penetrations of concrete slabs and walls, except where core-drilled holes are used. Install for cable and raceway penetrations of masonry and fire-rated gypsum walls

and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

L. FASTENING

Unless otherwise indicated, securely fasten electrical items and their supporting hardware to the building structure.

1. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or any other items.
2. Select fasteners so the load applied to any fastener does not exceed 25 percent of the proof-test load.

M. PENETRATIONS

Make all penetrations of electrical work through walls and roofs water and weather-tight.

N. MISCELLANEOUS REQUIREMENTS

1. Screen or seal all openings into outdoor equipment to prevent the entrance of rodents and insects.
2. Equipment fabricated from aluminum shall not be placed in direct contact with earth or concrete.
3. Do not exceed the dimensions indicated for equipment except as approved in writing by the Engineer.
4. Do not use equipment or arrangements for equipment that reduce the required clearance or exceed the space allocations.

O. DIMENSIONS

Dimensions indicated for electrical equipment and dimensions indicated for the installation of electrical equipment are restrictive dimensions.

1. Field measurements take precedence over dimensioned plans.

3.5 IDENTIFICATION

A. LABELS

Install labels where indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment. Conduit labeling is further described in section 16130. The labeling of conductors is further described in section 16120.

B. NOMENCLATURE

Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated on the Contract Documents or required by codes and standards. Use consistent designations throughout the Project.

C. SELF-ADHESIVE IDENTIFICATION PRODUCTS

Clean surfaces of dust, loose material, and oily films before applying.

D. IDENTIFY PATHS OF UNDERGROUND ELECTRICAL LINES

During trench backfilling, for exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above power and communication lines. Where multiple lines installed in a common trench or concrete envelope, do not exceed an overall width of 16 inches, use a single line marker.

E. ENGRAVED, PLASTIC-LAMINATED LABELS, SIGNS, AND INSTRUCTION PLATES

Engraving stock shall be melamine plastic laminate punched for mechanical fasteners with a minimum thickness of 1/16 of an inch for signs up to 20 square inches, and 1/8 of an inch thick for larger sizes. Engraved legend in black letters on white face. Provide nameplates on equipment enclosures giving the name and circuit identification of the enclosed device/equipment in 1/4 of an inch lettering.

F. PANELBOARD SCHEDULES

For proposed panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

G. ARC FLASH HAZARD

Provide and install warning labels for arc flash hazard on all proposed switchboards, panelboards, control panels, motor control centers, and other equipment per the requirements of the NEC and Washington State Administrative Code (WAC).

3.6 DEMOLITION

A. EQUIPMENT TO BE DEMOLISHED

Demolish all existing electrical devices and circuits, which are noted for demolition. Demolition includes, but is not limited to:

1. Removing all conduit, conductors, fittings, device boxes, hangers, panels, devices, etc., which are not concealed in the building structure or below grade/slab.

B. TEMPORARY POWER

Provide temporary power to existing branch circuit panels, branch circuits, and/or directly to electrical devices as required to keep all portions of the existing facility, which are occupied by the Owner, or required for operation, in operation at all times. Obtain approval by all appropriate code authorities, including the Department of Labor & Industries Electrical Inspection Department, or the local jurisdiction having authority, for any temporary connections required.

C. DAMAGED ELECTRICAL EQUIPMENT

Where remaining electrical work is damaged or disturbed in the course of the work, remove damaged portions, and install new products of equal capacity, quality, and functionality.

D. ABANDONED WORK

Remove existing conductors from conduits, unless otherwise indicated. Cut and cap buried raceway indicated to be abandoned

in place 2 inches below the surface. Cap and patch surface to match existing surface finish.

E. REMOVAL

See section 01900.

F. TEMPORARY DISCONNECTION

Remove, disconnect, store, clean, reinstall, reconnect, and make operational those components that are indicated for relocation and/or reconnection. Coordinate the process, mechanical, HVAC, and other equipment scheduled to be relocated and/or reused with other Divisions.

3.7 CUTTING AND PATCHING

Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for electrical installations. Perform cutting by skilled mechanics of the trades involved.

Repair disturbed surfaces to match adjacent undisturbed surfaces.

3.8 TOUCHUP PAINTING

Thoroughly clean damaged areas and provide primer, intermediate, and finish coats to suit the degree of damage at each location.

Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.

3.9 EXTRA MATERIALS

Extra materials in this Section cover all spare parts for electrical devices under this contract and are centrally listed here for clarification and completeness. Spares shall match products installed, and shall be packaged with protective covering for storage and identified with labels describing the contents within.

A. GENERATOR ASSEMBLIES (ASSOCIATED CSI SECTION – 16230)

1. Power Fuses (line power)

Provide 3 spare power fuses of each type and rating.

2. Control Fuses

Provide 10 percent (minimum of two) spare control fuses of each type and rating to cover all motor starters (not per starter).

Provide 1 control fuse puller.

3. Filters

Provide two sets each of lubricating oil, fuel, and combustion air filters.

4. V-Belts

Provide one complete replacement set of all V-belts.

5. Touchup Paint

Provide 1 quart (minimum) of touchup paint matching each color utilized on generator set.

6. Provide spare parts in suitable boxed watertight container marked "GENERATOR SPARE PARTS" and deliver to the Owner. Label with supplier's/manufacturer's name, the model number of the generator set, and the 24-hour service telephone number.

B. MOTOR CONTROLLERS (ASSOCIATED CSI SECTION – 16420)

The following quantities cover all motor starters under this contract (quantities are not per starter).

1. Power Fuses (line power)

Provide three spare power fuses of each type and rating.

2. Control Transformer Fuses (primary and secondary)

Provide 10 percent (minimum of two) spare control transformer fuses of each type and rating.

Provide one control fuse puller.

3. Control Fuses

Provide 10 percent (minimum of two) spare control fuses of each type and rating.

Provide one control fuse puller.

4. Control Relays

Provide 10 percent (minimum of two) spare control relays of each type and rating.

5. Control Timing Relays

Provide 10 percent (minimum of two) spare control timer relays of each type and rating.

6. Provide a single latching plastic container with a printed label adhered to the lid stating "MOTOR STARTER SPARE PARTS."

3.10 TESTING

A. Test electrical equipment before energization and placing into service. Provide all test results to the Owner in writing and include a copy in the O&M Manual. Where tests disclose a defect in the work, rework, or repair the work at no additional expense to the Owner and retest to confirm the rework or repair until testing confirms that the defect has been corrected. Test in accordance with the manufacturer's installation and testing instructions and the applicable electrical standards (i.e., NEMA, NFPA, IEEE, ISA, ANSI) for the class of equipment.

1. Test the equipment and electrical circuits for proper connection, tightness, continuity, and absence of undesirable shorts and grounds. When complete and 72 hours prior to energizing of the system, test the wire and cable installation. Check for continuity, visual damage, marking, and proper phase sequence before performing insulation testing.
2. Megger power equipment, bus work, switches, breakers, and associated devices phase-to-phase and phase-to-ground. Megger at or near the rated voltage, but not above. Disconnect and reconnect equipment which cannot be

meggered when connected. The minimum acceptable steady-state value is 50 megohms. Record ambient temperature and humidity during testing. Call any reading less than 100 megohms to the attention of the Engineer. Take appropriate steps to improve such values to permanent levels greater than 100 megohms.

3. Reference Section 16120, FIELD QUALITY CONTROL for impedance testing of power, control, and instrumentation conductors.
 4. Test operation, calibration, and settings of the meters, relays, and indicating devices.
 5. Test all operating controls for proper operation.
 6. Test all auxiliary equipment, i.e., heaters, thermostats, lights, all illuminated indicating devices and lamps, and all audible alarm devices which are an integral part of transformers and panels to verify that they function properly.
 7. Take load readings on each panelboard after all loads are connected. Record these measurements to give the maximum reading for each phase and neutral obtained with lighting, appliances, motors, and other loads connect to, and operating from, the panels in service.
 8. Check fuses with an ohmmeter. Ring out wiring and busing. Check operation of control and safety interlocks. Check grounding of potential transformers, current transformers, lightning, and surge arresters. Check control connections and tightness at terminal blocks, relays, meters, switches, etc.
- B. Rework or repair equipment, which performs unsatisfactorily during, or as a result of, testing at no additional expense to the Owner.
- C. Additional testing requirements specific to other sections are specified in those sections.

3.11 TEST DOCUMENTS

The following test documents shall be signed and submitted for review prior to energizing associated electrical circuits:

- A. Provide third party ground test documents as per Section 16060. These documents shall be signed by the independent testing agency and the contractor and issued and approved by the Engineer prior to energizing the power distribution system. A copy of these signed test results shall be included in the O&M Manual.
- B. Provide third party circuit breaker test documents as per Sections 16230 and/or 16410 and/or 16440. These documents shall be signed by the independent testing agency and the contractor and issued and approved by the Engineer prior to energizing the breakers. A copy of these signed test results shall be included in the O&M Manual.
- C. Provide a Power Conductor Megger Testing Report. A blank copy of this report, specifically associated with this contract, is available from Engineering on request. Execute megger testing as per the procedures described in Section 16120 – Conductors and Cables. A copy of these signed test results shall be submitted to the Engineer for approval prior to startup and shall be included in the O&M Manual.
- D. Provide a Motor Commissioning Test Report for each new or refurbished motor. A blank copy of this report, specifically associated with this contract, is available from Engineering on request. Motor Commissioning Test Reports shall be signed by the Contractor and approved by the Engineer prior to energizing the motors. A copy of these signed test results shall be included in the O&M Manual.

3.12 DEMONSTRATION

Demonstrate to the Owner that the electrical installation is working by operating all electrical systems and equipment. Simulate control and emergency conditions, artificially where necessary, for complete system tests. Demonstrate equipment in accordance with each section in Division 16.

3.13 CLEANING

Clean dirt and debris from all surfaces. Apply touchup paint as required to repair scratches, etc. Replace nameplates damaged during installation. Thoroughly vacuum the interior of all enclosures to remove dirt and debris.

***** END OF SECTION *****

SECTION 16060

GROUNDING AND BONDING

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes grounding of electrical systems, equipment, and basic requirements for grounding, and protection of life, equipment, circuits, and systems. Grounding requirements specified in this Section may be supplemented in other Sections of these Specifications.

1.2 RELATED WORKS SPECIFIED ELSEWHERE

<u>Sections</u>	<u>Items</u>
01300	Submittals
16050	Basic Electrical Materials and Methods
16120	Conductors
16130	Raceway and Boxes

1.3 DEFINITIONS

- A. BONDING JUMPER (from NEC 2008, Article 100 - Definitions, Bonding Jumper, Main)

The connection between the GROUNDED CIRCUIT CONDUCTOR and the EQUIPMENT GROUNDING CONDUCTOR at the service.

- B. EQUIPMENT GROUNDING CONDUCTOR (from NEC 2008, Article 100 - Definitions)

The conductive path installed to connect normally non-current-carrying metal parts of equipment together and to the SYSTEM GROUNDED CONDUCTOR or to the GROUNDING ELECTRODE CONDUCTOR, or both. Code requirements associated with equipment grounding is referenced to NEC 250, Section VI – Equipment Grounding and Equipment Grounding Conductors.

- C. GROUNDED CIRCUIT CONDUCTOR

See GROUNDING ELECTRODE CONDUCTOR.

D. GROUNDING ELECTRODE (from NEC 2008, Article 100 - Definitions)

A conducting object through which a direct connection to earth is established.

E. GROUNDING ELECTRODE CONDUCTOR (from NEC 2008, Article 100 - Definitions)

A conductor used to connect the SYSTEM GROUNDED CONDUCTOR or the equipment to a GROUNDING ELECTRODE or to a point on the grounding electrode system.

F. GROUNDING ELECTRODE SYSTEM

See SYSTEM GROUNDING.

G. SUSE

The term SUSE is an acronym for "SUITABLE FOR SERVICE ENTRANCE." It is the point in the electrical grounding system where the SYSTEM GROUNDING CONDUCTORS connect to the EQUIPMENT GROUNDING CONDUCTORS. For each separately-derived source, this shall occur at the SUSE point. These two points are connected by a BONDING JUMPER.

H. SYSTEM GROUND GRID

The SYSTEM GROUND GRID refers to all portions of SYSTEM GROUNDING. It may be as simple as a pair of ground rods and their associated GROUNDING ELECTRODE CONDUCTORS or a complex ground system with multiple types of GROUNDING ELECTRODES.

I. SYSTEM GROUNDED CONDUCTOR

See GROUNDING ELECTRODE CONDUCTOR.

J. SYSTEM GROUNDING

System Grounding (also referred to as a GROUNDING ELECTRODE SYSTEM) consists of all GROUNDING ELECTRODES, GROUNDING ELECTRODE CONDUCTORS, and associated connecting devices. The utility grounded service conductor, typically referred to as the "utility neutral", is also

associated with the system ground. Code requirements associated with system grounding is referenced to NEC 250.50 – Grounding Electrode System.

1.4 SUBMITTALS

Submit under provisions of Section 01300, and Section 16050.

1.5 QUALITY ASSURANCE

See Section 16050.

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING PRODUCTS

Where types, sizes, ratings, and quantities indicated are in excess of National Electrical Code (NEC) requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

2.2 WIRE AND CABLE GROUNDING CONDUCTORS

Comply with Section 16120.

A. EQUIPMENT GROUNDING CONDUCTORS

1. Insulated Conductors

Color coded green, per section 16120.

2. Sized in compliance with NEC Table 250.122 or as shown on the Plans, whichever is larger.

B. GROUNDING-ELECTRODE CONDUCTORS

1. Bare Conductors

Soft drawn stranded copper meeting ASTM B8.

2. Sized in compliance with NEC Table 250.66 or as shown on the Plans, whichever is larger.

C. GROUNDING BRAIDS

1. Copper, manufactured, sized at 26,240 circular mils minimum (#6 AWG equivalent).
2. Certified C22.2, No. 41, Grounding and Bonding Equipment.
3. UL Listings: UL-467 and UL486A.

2.3 GROUND RODS

A. SIZE AND TYPE

1. Ground rods shall be 3/4-inch diameter by 10-feet long unless otherwise stated on the Plans.
2. Ground rods shall be copperclad steel rods as follows:
 - a. Heavy uniform coating of electrolytic copper molecularly bonded to a rigid steel core.
 - b. Corrosion resistant bonding between the copper and steel.
 - c. Hard drawn for a scar-resistant surface.

2.4 GROUND ROD BOX

A. GROUND ROD BOXES

1. Ground rod boxes shall be "Fogtite Ground Rod Box" or equal.

B. GROUND ROD BOX LIDS

1. Ground rods associated with vaults, pullboxes, or handholes that may be subjected to road traffic or heavy loads shall have their ground box lids match the road rating load value of the associated vaults, pullboxes, or handholes.
2. The minimum ground rod box lid shall be rated H20.

2.5 CONNECTOR PRODUCTS

A. COMPRESSION CONNECTORS

1. Compression type for interior locations:
 - a. Standards: UL 467.
 - b. High copper alloy content.
 - c. Non-reversible.
 - d. Terminals for connections to bus bars shall have two bolt holes.
2. Compression type suitable for direct burial in earth or concrete:
 - a. Standards: UL 467, IEEE 837.
 - b. High copper alloy content.
 - c. Non-reversible.

B. BOLTED CLAMPS

1. Standards: UL 467.
2. High copper alloy content.
3. Heavy-duty type.

PART 3 APPLICATION

There are two types of grounding systems covered in this specification; 1) Grounding Electrode Systems and 2) Equipment Grounding Circuits.

1. Grounding Electrode Systems shall comply, as a minimum, to the requirements of NEC Sections 250.50 through 250.104, including Table 250.66, "Grounding Electrode Conductor for Alternating-Current Systems."
2. Equipment Grounding Circuits shall comply, as a minimum, to the requirements of NEC Sections 250.110 through 250.148, including

Table 250.122, "Minimum Size Equipment Grounding Conductors for Grounding Raceway and Equipment."

3.1 GROUND ROD BOX

The connection of Grounding Electrode Conductors to each ground rod shall be accessible through a ground rod box as described herein.

- A. Each ground rod shall be provided with a separate ground rod box which shall provide access to the ground rod, its Grounding Electrode Conductor, and its associated ground clamp.

Exceptions:

- *Unless specifically stated or detailed otherwise on the Plans.*
- *Ground rod boxes shall not be required if the ground rod is exposed in a manhole, handhole, or seal-off vault as described in this specification.*

- B. Each ground rod box shall be mounted flush to grade.

Exceptions:

- *Unless specifically stated or detailed otherwise on the Plans.*

3.2 GROUNDING ELECTRODE SYSTEMS

Comply with NEC Article 250, Section III for types, sizes, and quantities of Grounding Electrode Conductors, except where specific types, larger sizes, or more conductors than required by NEC are shown on the Plans.

Provide grounding system as shown on the Grounding One Line Diagram of the Plans if provided.

A. GROUNDING ELECTRODE SYSTEM

A GROUNDING ELECTRODE SYSTEM shall have a minimum of two ground rods spaced a minimum of 6 feet apart and connected with Grounding Electrode Conductors as described in this Section.

B. SYSTEM GROUND GRIDS AROUND STRUCTURES WITH CONCRETE FLOORS OR STEM WALLS

A ground grid shall consist of a ring of Grounding Electrode Conductors around a building or structure placed a maximum of 3 feet away from the structure at a minimum depth of 30 inches below grade with its ground connection established in one of the three following ways: (1) with ground rods; (2) with “concrete-encased electrodes;” or (3) with a combination of both (1) and (2).

When the Plans specifically show, state, or define the method of establishing the SYSTEM GROUND GRID and show the distribution and sizes of the Grounding Electrode Conductors, then these methods shall be followed unless required to be larger by NEC Table 250.66.

When the Plans state that the Contractor may define the method of grounding, then it is left to the Contractor to provide one of the three grounding methods in compliance to NEC and with the approval of the Electrical Engineer and the Electrical L&I Inspector. Regardless of the method used, the Contractor is responsible to provide and meet the testing requirements in QUALITY CONTROL in this Section.

1. Establishing a SYSTEM GROUND GRID with Ground Rod Electrodes
 - a. Ground rods shall be placed at each of the major corners of the structure. If a structure has an irregular shape with corners spaced more than 10 feet apart, than a ground rod shall be placed at that corner.

2. Establishing Ground with “Concrete-Encased Electrodes”

A “concrete-encased electrode” ground system shall be allowed only if the building or structure is provided with a new concrete floor in direct contact with the earth and meets or exceeds the requirements of NEC Section 250.52.

- a. Attach a separate Grounding Electrode Conductor from the SYSTEM GROUND GRID to the foundation rebar in each of the four corners of the building or structure minimum.

C. VAULT AND PULLBOX GROUNDING

1. Provide a SYSTEM GROUND GRID around Pullboxes and Equipment Vaults in compliance with ground conductors sized per NEC Table 250.66 unless shown larger on the Plans. The minimum grounding electrode conductor size shall be #6 AWG.

D. MANHOLE, HANDHOLE, AND SEAL-OFF VAULT GROUNDING

1. Provide a ground rod inside each manhole, handhole or seal-off vault that contains metal parts.

E. OTHER GROUNDING ELECTRODE DEVICES AND METHODS

1. Hydraulic Piping Systems

- a. Provide and connect a Grounding Electrode Conductor pigtail to metal hydraulic piping on each major riser. Connect the conductors to the pipe using NEC-approved hardware and methods.
- b. Provide a ground jumper across both sides of a hydraulic piping electrical insulator to continue ground continuity past the insulator.

Exceptions:

- i. Unless specifically stated or detailed otherwise on the Plans.*

c. Ground shall be derived from:

- i. SYSTEM GROUND GRID
- ii. System SUSE connection point.

2. Magnetic Flow Meters

- a. Provide and connect a Grounding Electrode Conductor to the flow meter manufacturer's ground rings as per the manufacturer's recommendations. Provide a #6 AWG ground conductor unless shown otherwise on the Plans.

Exceptions:

- *Unless manufacturer provides documentation verifying that ground rings are not required.*

3. Generators

a. In addition to the equipment ground provided with the generator feeder, provide a grounding electrode conductor to the generator's neutral terminal sized per the Plans or per NEC Table 250.66, whichever is larger. Treat this conductor as a neutral wire.

b. Grounding Methods

i. The Grounding Electrode Conductor shall be connected to the neutral terminal of the generator as a neutral. This conductor shall be connected to the grounding system at the SUSE bonding connection.

If required to run through a transfer switch, then this neutral wire shall terminate at the transfer switch's isolated neutral bus before continuing to the SUSE bonding point.

ii. The Equipment Grounding Conductor shall be connected to the metal frame of the generator in compliance with NEC.250.110.

4. Separately Derived Sources

a. Ground step-down power transformer secondary neutral "XO" terminals to Grounding Electrode Conductors.

i. System Ground Grid

b. Ground step-down power transformer secondary neutral "XO" terminals to Grounding Electrode Conductors.

3.3 EQUIPMENT GROUNDING

Comply with NEC Article 250, Section VI for sizes of Equipment Grounding Conductors, except where specific larger sizes are shown on the Cable and Conduit Schedule in the Plans.

A. EQUIPMENT GROUNDING CIRCUITS

Install insulated Equipment Grounding Conductors with circuit conductors in the manner listed below and in compliance with Code.

1. Service and Feeders.

Bond the Equipment Grounding Conductor to the equipment to which the circuit connects and to the raceway if it is metallic.

2. Single-phase motor or appliance branch circuits.

3. Three-phase motor or appliance branch circuits.

4. Flexible raceway runs.

B. EQUIPMENT GROUNDING CONDUCTORS

Equipment Grounding Conductors shall be insulated and color-coded green.

C. ISOLATED GROUNDING-RECEPTACLE CIRCUITS

Install a separate insulated Equipment Grounding Conductor connected to the receptacle grounding terminal. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at the Equipment Grounding Conductor terminal of the applicable derived system or service, except as otherwise indicated.

D. NONMETALLIC RACEWAYS

Install an Equipment Grounding Conductor in nonmetallic raceways unless they are designated for telephone or data cables. Bond the conductor at each end to grounded metallic raceway or equipment.

E. METALLIC RACEWAYS

Install grounding bushings at the end of each conduit and connect to the equipment ground or GROUNDING ELECTRODE SYSTEM.

F. WATER HEATER, HEAT-TRACING, AND ANTIFROST HEATER CIRCUITS

Install a separate Equipment Grounding Conductor to each electric water heater, heat-tracing assembly, and antifrost heating cable. Bond conductor to heater units, piping, connected equipment, and components.

3.4 FREE-STANDING ELECTRICAL SUPPORT STRUCTURES

Metal support structures used to support electrical equipment, devices, cabinets, panels, or enclosures shall be connected to the GROUNDING ELECTRODE SYSTEM or a separate ground rod by Grounding Electrode Conductors sized as shown on the Plans. Provide a ground conductor to each vertical support member within 6 inches after rising out of the concrete pad.

PART 4 EXECUTION

4.1 INSTALLATION

A. GROUNDING ELECTRODE CONDUCTORS IN RACEWAYS

1. GROUNDING ELECTRODE CONDUCTORS shall not be installed in metallic raceway. Where required to be in raceway, use PVC-Schedule 80 unless shown otherwise on the Plans. Reference Specification Section 16130.

Ground electrical systems and equipment according to NEC requirements, except where Plans or Specifications exceed NEC requirements.

Coordinate grounding connections made to the water system with the mechanical work and install bonding jumpers wherever deemed necessary.

B. VAULT AND PULLBOX SYSTEM GROUNDING

1. Grounding Outside the Structure
 - a. Provide a minimum of two ground rods, one at each opposite corner, spaced at least 6 feet apart, on the outside of the structure.
 - b. Provide a ground rod box over each ground rod with the same rod rating of the pullbox/vault lid.
 - c. Space the SYSTEM GROUND GRID a minimum of 12 inches from the edge of the vault.
 - d. Connect the vault/pullbox SYSTEM GROUND GRID to the main SYSTEM GROUND GRID with Grounding Electrode Conductor sized per NEC Table 250.66 unless shown larger on the Plans. The minimum conductor size shall be #6 AWG.
2. Grounding Inside the Structure
 - a. Provide a Grounding Electrode Conductor into the vault at one of the four corners. Seal the penetration with non-shrink grout.
 - b. Continue the Grounding Electrode Conductor up one corner to 3 - 6 inches below the vault ceiling. Loop the Grounding Electrode Conductor around the vault at this height, on all walls containing a junction box, cable tray, ladder, or other metallic equipment, securing to the vault walls each 24 inches with 316L stainless steel clamps, lag bolts, and fasteners.
 - c. Extend a Grounding Electrode Conductor to one of the top mounting bolts of each junction box, cable tray, permanent ladder, or other metallic equipment.
 - d. For vaults with metallic hatch lids, provide a grounding braid from the Grounding Electrode Conductor to the hatch lid, sized per NEC Table 250.122 minimum. Provide the braid on the hinged side, sufficiently long to allow a complete 180 degree opening of the hatch lid without tension on the braid.

For vaults with dual lids, connect grounding braids to both hinged sides.

- e. Ground hydraulic piping near its points of entry into, and exit out of, the vault.
- f. Ground manufacturer's instrumentation devices inside the vault per the manufacturer's recommendations.

C. MANHOLE, HANDHOLE, AND SEAL-OFF VAULT SYSTEM GROUNDING

- 1. Provide a ground rod inside each handhole that contains metal parts.
- 2. Expose a minimum of 4 inches of the ground rod above the floor for field inspection and connections to the rod.
- 3. Connect the manhole/handhole/seal-off vault SYSTEM GROUND GRID to the main SYSTEM GROUND GRID with Grounding Electrode Conductors sized per NEC Table 250.66 unless shown larger on the Plans. The minimum conductor size shall be #6 AWG.
- 4. Connect the Grounding Electrode Conductor to each metal lid with braided ground conductors of equivalent size and ampacity of the ground ring. Connect braid to metal lids as per manufacturer's recommendations.
- 5. Connect the Grounding Electrode Conductor to each metal device (conduits, cable tray, j-boxes, support structures, etc.).

4.2 CONNECTIONS

A. GENERAL

Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

- 1. Use electroplated or hot-tin-coated materials to assure 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. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to the contact surfaces.

B. EQUIPMENT GROUNDING-WIRE TERMINATIONS

Make the grounding conductor connections to motors or equipment 10 hp and above or 20 amperes and above, with conductor termination and a 5/16 of an inch minimum bolt tapped to the motor frame or equipment housing. Ground connection to smaller motors and equipment may be made by fastening the conductor termination to a connection box.

C. METAL RACEWAY TERMINATIONS

Where metallic raceways terminate at metallic or non-metallic enclosures, panels, or housings, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at both entrances and exits with grounding bushings and bare grounding conductors, except as otherwise indicated.

D. CONNECTION TORQUE

Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. Where these requirements are not available, use those specified in UL 486A and UL 486B.

E. COMPRESSION-TYPE CONNECTIONS

Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by manufacturer of connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

4.3 QUALITY CONTROL

A. INDEPENDENT TESTING AGENCY

Engage an independent electrical testing organization to perform tests described below.

B. TESTS

1. Subject the completed GROUNDING ELECTRODE SYSTEM to a 3-point fail-of-potential ground test according to IEEE 81. Perform the test not less than 2 full days after the last trace of precipitation, and without the 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.
2. These 3rd party measurements shall be documented, signed, and submitted to the Engineer for approval prior to commissioning at the site.

C. MAXIMUM GROUNDING RESISTANCE VALUES

Maximum grounding resistance values shall be as listed below:

1. Equipment grounding connections: 25 ohms.
2. Main Service (grounding electrode): 5 ohms.

D. EXCESSIVE GROUND RESISTANCE

Where resistance to ground exceeds specified values, notify the Engineer. Check connections of affected equipment and conductors. Replace or repair defective connections or conductors. Provide additional ground rods where the grounding electrode resistance is greater than specified. Revise and retest until resistance is within specifications.

E. REPORT

Prepare test reports, certified by the testing organization, of ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

***** END OF SECTION *****

SECTION 16120

CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes building wires, cables, and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.2 RELATED WORKS SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
13430	Control Panels
16050	Basic Electrical Materials and Methods
RCW 19.28.261	Revised Code of Washington, Exemptions from RCW 19.28.161 through RCW 19.28.271

1.3 SUBMITTALS

See Section 01300.

Indicate Field Test Reports and interpret their results for compliance with performance requirements.

1.4 QUALITY ASSURANCE

See Section 16050.

PART 2 PRODUCTS

2.1 BUILDING WIRES AND CABLES

A. STRANDING

1. All power, control, and instrumentation conductors shall be stranded.
2. All equipment ground conductors shall be stranded.
3. All grounding electrode conductors shall be stranded.

B. POWER AND CONTROL WIRE

All power and control wire and conductors in raceways shall be rated 600 VAC.

1. XHHW, XHHW-2

a. Conductor

Class B, stranded, annealed, uncoated copper. Conductors shall comply with:

- i. UL Standard 44.
- ii. ASTM-B3, ASTM-B8, and ASTM-B7B8.

b. Insulation

Cross-Linked Polyethylene (XLP) High Heat Water Resistant. Insulation shall comply with:

- i. UL-83 Thermoplastic-Insulated Wires and Cables.
- ii. UL-1063 Machine-Tool Wires and Cables.

c. The cable shall meet the following Standards and Agency approvals:

- i. NEMA WC70/ICEA S-95-658.
- ii. ASTM Stranding Class B3, B8, B7B8
- iii. Federal Specification A-A-59544

2. THHN, THWN, THHN/THWN-2

a. Conductor

Copper, annealed, uncoated. Conductors shall comply with:

- i. ASTM-B3, ASTM-B8, and ASTM-B7B8.

b. Insulation

Polyvinyl Chloride (PVC), Nylon jacket. Insulation shall comply with:

- i. UL-83 Thermoplastic-Insulated Wires and Cables.
- ii. UL-1063 Machine-Tool Wires and Cables.

c. The cable shall meet the following Standards and Agency approvals:

- i. NEMA WC70/ICEA S-95-658.

3. MTW (Machine Tool Wiring)

a. Conductor

Copper, annealed, uncoated. Conductors shall comply with:

- i. ASTM-B3, ASTM-B8, and ASTM-B7B8.

b. Insulation

Polyvinyl Chloride (PVC). Insulation shall comply with:

- i. UL-83 Thermoplastic-Insulated Wires and Cables.
- ii. UL-1063 Machine-Tool Wires and Cables.

c. The cable shall meet the following Standards and Agency approvals:

- i. NEMA WC70/ICEA S-95-658.
- ii. UL Standard UL 83, UL 1063, UL 758 cUL file: E156879 and E123744
- iii. AWM Specification 1316, 1317, 1318, 1319, 1320, 1321

- iv. ASTM Stranding Class B3, B8, B7B8
- v. Federal Specification A-A-59544
- vi. CSA 22.2 No. 75, UL E156879 and E123744

C. INSTRUMENTATION, COMMUNICATION, AND NETWORKING CABLES

All instrumentation, communication, and networking cables and conductors in raceway shall be rated 600 VAC.

Exceptions:

- *Telephone cables.*
- *Antenna cables.*
- *Fiber optic cables.*

1. Analog Instrument Cables

Paired and triad analog instrument cables shall be #18 AWG stranded tinned copper 600 V tray cable, rated for wet applications at 75 degrees C in a sunlight resistant PVC jacket. Cables shall be plenum and direct burial rated, and shall be provided with individual pair/triad isolated 100 percent foil shields with independent drain wires and an overall isolated shield with drain wire.

These cables shall also be used for totalizing pulse signals from flow meters.

The following cables shall be used for multiple conductor applications:

- a. 2-Conductor, 1 twisted pair, 100 percent overall shield. Belden #9341.

D. CONTROL AND POWER CABLE/CORDS

1. Power Cords

- a. Type SO, 600 Vac, size #14 or larger.

2. Specialty Wire

As shown specifically on the Plans.

2.2 SPLICES, TAPS AND TERMINAL BLOCKS

Splices are only allowed under the conditions of Section 4.2.E.

A. SPLICES IN OUTDOOR AREAS, HANDHOLES, VAULTS, OR DIRECT BURIED

For inline butt splices, use inline resin splice kits for non-shielded cables, 600 V; 3M Scotchcast 82-A series or equal. UL listed 486D.

For odd-shaped and odd sized splices, use multi-mold resin splice kits for non-shielded cables, 600 V; 3M Scotchcast 85-14CP or equal. UL listed 486D.

B. INDOOR SPLICES AND TAPS FOR RECEPTACLES AND LIGHTING

Use quick spin, wing torque Electrical Spring and Grounding Connectors; 3M 312, 412, 512, and 512G or equal.

C. TERMINAL BLOCKS

1. Power Terminal Blocks

All power terminals shall be 600 Vac, suitable for 75 °C rated copper conductor.

Power terminal blocks may be copper or aluminum and shall have a short circuit current withstand rating following the guidelines described in UL 1059 and shall meet or exceed the available bolted fault current at the point of application

2. Control and Instrumentation Terminal Blocks

Reference Specification 13430 for terminations in Control Panels.

D. MOTOR LEAD CONNECTORS

Motor terminal connectors shall be insulated multiple tap connectors rated for 600 Vac; N.I.S. Polaris or equal.

2.3 INSULATING MATERIALS

A. ELECTRICAL INSULATION PUTTY

Scotchfill, or equal.

B. INSULATING ELECTRICAL TAPE

7 Mil/0.18 mm Plasticized PVC, rubber-based adhesive, 200 percent elongation, 26 N/cm tensile strength, 8 kV breakdown voltage, meeting CE, CSA, UL certifications.

C. CONDUCTOR COLOR-MARKING TAPE

7 Mil/0.18 mm Plasticized PVC, rubber-based adhesive, 200 percent elongation, 26 N/cm tensile strength, 8 kV breakdown voltage, meeting CE, CSA, UL certifications, in required color.

D. ELECTRICAL HEAT SHRINK TUBING

Heat shrink tubing shall be dual-wall polyolefin, 3-1 shrink ratio, 600 Vac, -55 to 110 degrees C operating range meeting UL 224 600V, 125 degrees C.

PART 3 APPLICATIONS

3.1 WIRE APPLICATIONS

A. CABLE AND CONDUIT SCHEDULE

The Cable and Conduit Schedule shall be considered absolute. No changes to wire sizes, wire count, insulation type, or circuit type shall be allowed without approval from the Engineer.

B. WIRES IN RACEWAYS

Wires installed in raceways shall be considered "FIELD" wiring and shall be installed and terminated by qualified and licensed electrical contractors.

Exceptions:

- *Installation and termination may be by the owner under the provisions of "RCW 19.28.261, Exemptions from RCW 19.28.161 through RCW 19.28.271."*
- *If the raceway is installed inside a control panel fabricated by a certified UL 508 shop, then these wires may be installed and terminated per the provisions of WIRES IN CONTROL PANELS as listed below.*

1. Power Wire

a. Insulation

All service, feeder, and branch circuit conductors shall be XHHW-2. All termination shall include dielectric grease.

Exception:

- *Unless called out otherwise in the Cable and Conduit Schedule.*
- *Unless approved in writing by the Electrical Engineer.*
- *Unless both ends of wire are installed in the same control panel.*

2. Class 1 And 2 Control Wire

a. Insulation

All control circuits in raceways shall be XHHW-2.

Exception:

- *Unless called out otherwise in the Cable and Conduit Schedule.*
- *Unless approved in writing by the Electrical Engineer.*

C. WIRES IN CONTROL PANELS

Wires in control panels are those wires that are not routed through raceways external to control panels.

1. Control Panel Power And Control Wire

a. Insulation

Power and control conductors in control panels shall be MTW or THHN/THWN-2.

Wire minimum size and color:

Circuit Type	Wire Size	Wire Color
120 Vac Circuits		
120 Vac, Line	#12 AWG	Black
120 Vac, Neutral	#12 AWG	White
120 Vac Control Circuits	#14 AWG	Red
Ground Circuits		
Chassis Ground	#12 AWG	Green
24 Vdc Circuits		
+24 Vdc Power	#14 AWG	Dark Blue
24 Vdc Common	#14 AWG	White with Blue stripe
24 Vdc Control Circuits	#14 AWG	Dark Blue

D. CONDUCTORS DIRECT BURIED

Refer to the Plans for specifications regarding directly buried conductors and cables.

E. SPECIALTY WIRE

Refer to the Plans for specifications regarding "Specialty Wire".

PART 4 EXECUTION

4.1 EXAMINATION

Examine raceways and surfaces receiving wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

4.2 INSTALLATION

A. GENERAL INSTALLATION METHODS

1. Install wires and cables in raceway system, according to manufacturer's written instructions and NECA's "Standard of Installation," after raceway system is complete.
2. 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 and UL 486B.
3. Install cables and conductors neatly in all enclosures. Bend or form wires in neat runs from conduits to terminals. Arrange wires so that they may be grouped by conduit or function in the enclosure. Install cable ties and straps to support and bundle wires in enclosures. Arrange wires to allow wire tags and numbers to be easily read without bending or flexing wiring.
4. Install wiring to equipment neutral and grounding blocks on the bottom or furthest back row first. Leave unconnected blocks accessible for future neutral or grounding connections.
5. Provide individual neutral conductors for each associated circuit. Common neutral conductors for multi branch circuits are not permitted.
6. All power distribution raceways shall contain at least one continuous copper grounding conductor with a minimum size as per NEC 250.122. Larger sizes shall be used if identified in the Cable and Conduit Schedule on the Plans.

B. CONDUCTORS SHARING RACEWAYS

1. 120 VAC power conductors shall not be run in the same raceway with control conductors.

Exception:

- *Unless specifically shown otherwise in the Cable and Conduit Schedule.*

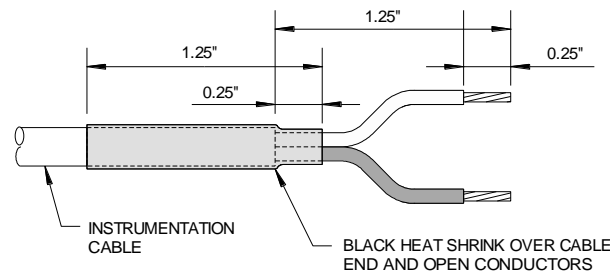
2. 120 VAC power conductors shall not be run in the same conduit or raceway with instrumentation cables/conductors.
3. 120 VAC control conductors shall not be run in the same conduit or raceway with instrumentation cables/conductors.

Exception:

- *Unless specifically shown otherwise in the Cable and Conduit Schedule.*

C. INSTRUMENTATION (SIGNAL) CABLES

1. Preparing the End



- a. Neatly trim the end of the cable.
- b. Strip back 1.25" of the outer jacket taking care not to cut into the signal conductor insulation.
- c. Neatly trim the foil back to the edge of the outer jacket.
- d. Cut the drain wire at the edge of the outer jacket taking care not to damage the signal conductor insulation.
- e. For signal cables with a braided shield over a foil shield, carefully cut the braid back to the edge of the outer jacket.
- f. Provide a 1.25" black heat shrink over the jacket, covering 0.25" of the exposed conductors. This properly insulates and protects the ends of the shields and the outer jacket.

- g. Strip the signal conductors exposing 0.25" of conductor.

E. SPLICING CONDUCTORS

1. Install service, feeder, and motor circuits continuous without splices from equipment terminal to equipment terminal or motor lead.

Exceptions:

- *Service entry feeders at weatherheads.*
- *Branch circuits at taps for convenience receptacles and lighting.*
- *As specifically called out.*
- *With written permission from the Engineer.*

2. Install instrumentation and control circuits continuous without splices or terminations from source equipment terminal to destination equipment terminal.

Exceptions:

- *On terminal strips in control panels.*
- *On terminal strips in termination panels.*
- *As specifically called out.*
- *With written permission from the Engineer.*

3. Where splicing is allowed, or specifically called out, install in the following manner:

- a. Splicing Inside Vaults, Handholes, Outdoor J-Boxes, or J-Boxes in Wet Areas

Power and control conductors shall be spliced per Section 2.2.A. Provide a minimum of 24 inches of length on both wires for future re-splicing.

b. Splicing Inside Motor J-Boxes

Power connections inside motor j-boxes shall be made using insulated multiple tap connectors rated for 600 Vac; N.I.S. Polaris or equal. Cover the splice with a minimum of three layers of black insulating electrical tape. Provide a single band with a minimum of two wraps of the appropriate phase color tape to the entry T-lead. Bend the connections away from the sides of the j-box and motor frame to prevent abrasion from motor vibration.

Control connections inside motor j-boxes shall be made with crimped butt-splices with heat shrink covers. The heat shrink shall overlap the butt barrel ends by a minimum of 1/2 inch on each side. Cover the splice with a minimum of three layers of black insulating electrical tape.

c. Splicing in J-Boxes and Control Panels Mounted Indoors in Dry Rooms

i. Conductors size #12 AWG through #6 AWG:

For conductors less than #6 AWG, provide crimped butt-splice with heat shrink cover. The heat shrink shall overlap the butt barrel ends by a minimum of 1/2 inch. Cover the splice with a minimum of three layers of black electrical tape. Provide a 2-wrap (minimum) single band of the appropriate phase color tape.

Exception:

- *For receptacles and lighting, reference Section 2.2.B.*

ii. Conductors size #4 AWG and larger:

(1) Terminal Connectors

For conductors larger than #6 AWG, connections shall be made using

insulated multiple tap connectors rated for 600 Vac; N.I.S. Polaris or equal.

Cover the splice with a minimum of three (3) layers of black electrical tape. Provide a 2-wrap (minimum) single band of the appropriate conductor color tape.

(2) Terminal Blocks

All power terminals shall be 600 Vac, suitable for 75 degrees C rated copper conductor.

Connect using properly sized terminal blocks.

Exception:

- *If splices are allowed by the Engineer, then use plated copper alloy compression splicing sleeves installed by high-pressure compression tools and insulated with heat shrink Raychem sleeves.*

F. REPLACING FAULTY CONDUCTORS

When replacing a faulty conductor or cable that shares a raceway with other conductors or cables, all conductors and cables must be removed and replaced with new.

Exceptions:

- *If the raceway is straight and without bends or offsets and its length is less than 30 feet, and the conductors are not bound together in the raceway, then only the faulty cable must be pulled and replaced with new. A manufacturer-approved pulling compound or lubricant must be used to minimize degradation to the remaining conductors. The contractor is responsible for the integrity of the remaining conductors.*
- *With specific approval by the Engineer.*

G. CONDUCTOR LABELLING

All conductors shall be labeled in the following manner.

Exceptions:

- *Conductors supplying power to lighting and convenience receptacles.*
 - *Non-insulated ground conductors.*
 - *At each motor tag for winding lead numbers. Make all phase rotation changes for motor direction changes at the motor to maintain correct color phase sequence in equipment.*
 - *In each enclosure or box where more than one ungrounded power conductor is spliced or connected, tag for panelboard identification and pole number (reference Section 3.3C.).*
1. Conductors shall be labeled the same at each end in a place where the label can be clearly read without moving other wires or rotating the label.
 2. Conductor labels shall reference the device (destination) tag as provided on the "TAG LIST" in the Plans. For example, conductors from panelboard [01 PB 01] to dedicated receptacle [01 DREC 05] shall be labeled as follows:

Line:	01DREC05.L
Neutral:	01DREC05.N
Ground:	01DREC05.G

3. Conductor labels shall each be unique for each circuit. For example, 10 control conductors from Main Control Panel [02 CP 01] (source) to Automatic Transfer Switch [02 ATS 01] (destination) shall be labeled as follows:

Wire #1:	02ATS01.01
Wire #2:	02ATS01.02
Wire #9:	02ATS01.09
Wire #10:	02ATS01.10

4. The labels shall be white heat shrink sized appropriately for the associated conductor with typed lettering in black indelible ink.
5. Label each conductor. When terminating cables, if there is insufficient room to provide a label on each conductor, then label the cable sheath.
6. Tag for phase rotation at each power connection.

Exception:

- *At motor connections.*

H. CONDUCTOR COLORS

1. For conductor colors inside control panels, reference Section 3.1.C.1.
2. Do not use white, gray, green, or green with yellow stripes color for any power, lighting, or control conductor not intended for neutral or equipment grounding purposes.

Exception:

- *Instrumentation and control multi-conductor cables may use white, gray, or green singly or as part of a trace color in addition to the base color.*

3. Equipment grounding conductors: Green or green with yellow stripes.
4. 208/120 or 240/120 volt, 3-phase systems:

Phase A	Phase B	Phase C	Neutral
Black	Red	Blue	White

5. 240/120 volt, single phase systems:

Phase A	Phase B	Neutral
Black	Red	White

6. 480/277 volt, 3-phase systems:

Phase A	Phase B	Phase C	Neutral
Brown	Orange	Yellow	Grey

7. Use wire with insulation of required color for conductors of #8 AWG and smaller. For wire larger than No.8 AWG, where not available in specified colors, use conductor color marking tape per Section 2.3.C. When conductors are marked in this manner, mark each conductor at all accessible locations such as panelboards, junction boxes, pullboxes, auxiliary gutters, outlets, switches, and control centers.
8. Use control wiring of colors different than power wiring or supplied with a trace of color in addition to the basic color of the insulation. Use the same color scheme throughout a given system for any control wires performing the same function.
9. Connect power conductors of the same color to the same phase throughout the installation. Viewing all equipment from the front, make connections so phase color sequence is in the same order as that for panelboards, switchboards, motor control centers, etc.

I. PULLING CONDUCTORS

1. Instrumentation, Communication, Networking, and Fiber Cables

Make all cable pulls by hand using a manufacturer-approved pulling compound or lubricant where necessary.

2. Power and Control Conductors
- a. Make all cable pulls by hand where possible. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, or wrapping extra conductor into an eye, that will not damage cables or raceway.
- b. On mechanically-assisted pulls use a manufacturer-approved pulling compound or lubricant where necessary. The compound used must not deteriorate

the conductors or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values. Install pullboxes where necessary to prevent exceeding manufacturer's recommendations.

3. Cut cable or conductor ends off after pulling and clean all pulling compound from exposed conductors before terminating.

J. CABLE SUPPORTS

Support cables according to Section 16050.

Provide vertical conductor support per NEC Table 300.19(A).

K. WIRING AT OUTLETS

1. Install conductor at each outlet, with at least 6 inches of slack. Connect only to receptacle screw terminals using insulated spade-type lugs.
2. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer, and in compliance with other Sections of Division 16.

4.3 FIELD QUALITY CONTROL

A. TESTING

On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures

Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.3.2. Certify compliance with test parameters.

2. Remove and replace conductors with visible insulation damage on conductor ends due to installation in an incomplete or damaged conduit system such as, but not limited to, missing bushings or burrs on conduit ends.

3. On THWN, THHN, THHW conductors, a tear, rip, or blister in the outer insulation sheath shall be considered damaged insulation and shall be replaced as described in Section 4.3.A.2.

B. POWER CONDUCTOR TESTING

After pulling and prior to connection, perform a Megger test between all conductors (including the equipment ground) and between each conductor and earth ground in the following manner:

1. Perform megger tests at 600 V.
2. Record ambient temperature and humidity during testing.
3. Cables or conductors with a steady-state value less than 100 megohms shall be considered “failed”.
4. Complete a Power Conductor Megger Testing Report and submit as per Section 16050.

C. CONTROL AND INSTRUMENTATION CONDUCTOR TESTING

Control and instrumentation circuits shall not be meggered.

1. Perform insulation tests with a Digital Voltmeter.
2. Record ambient temperature and humidity during testing.
3. Cables or conductors with a steady-state value less than 100 megohms shall be considered “failed”.

D. CORRECTIVE ACTION FOR FAILED CABLES AND CONDUCTORS

Failed cables and conductors shall be removed and replaced with new and retested per Section 4.2.D.

***** END OF SECTION *****

SECTION 16130

RACEWAY AND BOXES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 RELATED SECTIONS INCLUDE THE FOLLOWING:

<u>Sections</u>	<u>Items</u>
01300	Submittals
02530	Utility Structures
16050	Basic Electrical Materials and Methods
16060	Grounding and Bonding
16120	Conductors and Cables
16140	Wiring Devices

1.3 DEFINITIONS

A. 100 PERCENT CONTINUOUS

100 percent continuous means that electrical continuity shall be maintained over a conduit's entire length and that such conduits shall consist of only RGS (whether PVC-coated or not), LFMC, or combinations of these types. There can be no break in the electrical continuity by non-metallic components.

IMC conduits are considered 100 percent continuous.

B. CONDUIT BODIES

A separate portion of a conduit system that provides access through a removable cover to the interior of the system at a junction of two or more sections of the system.

C. CONTROL CONDUITS

Control conduits typically contain cables or conductors in the range of 12 Vdc to 120 Vac. These cables/conductors are used to provide discreet field inputs and outputs to motor drives, PLC controllers, operator stations, etc. They typically connect to

discreet I/O field devices like local panel pushbuttons, indicating lights, selector switches, field limit switches, relay circuits, etc.

D. CONTROL PANELS

Control panels are enclosures in which one or more circuits are changed, unlike junction boxes where circuits are simply routed through the panel. Control panels may be as simple as an enclosure with a pilot light or they may be very complicated with hundreds of I/O terminations. For Control Panel considerations, reference Specification 13430.

E. CONVENIENCE RECEPTACLES

Reference Section 16140, Definitions.

F. DEVICE BOXES

Device boxes are electrical boxes used for receptacles, light switches, dimmers, and other similar devices. Selector switches, indicating lights, displays, etc., are mounted in control panels and equipment enclosures, not in device boxes.

G. DRIP FITTINGS

Drip fittings are used to drain water from conduit entry points, junction boxes, or other enclosures where accumulation of moisture must be removed. They are also intended to disable the entry of foreign materials, including tools and fingers, through the drain.

H. DRY LOCATIONS

Reference Section 16050, Definitions.

I. EQUIPMENT VAULT

An Equipment Vault is a VAULT that contains one or more electrical devices that are terminated within the vault; such as flow meters, control valves, control or power panels, lighting, and etc.

SEE VAULTS

J. FINISHED AREAS

Reference Section 16050, Definitions.

K. FMC

Flexible Metal Conduit (a type of RMC).

L. FRP

Fiberglass Reinforced Plastic (a type of RNC).

M. HANDHOLES

A handhole is a pullbox that is not sufficiently sized for entrance of personnel (reference PULLBOXES).

N. IMC

Intermediate Metal Conduit (a type of RMC).

O. INSTRUMENTATION CONDUITS

Instrumentation conduits contain cables and conductors that carry low-power modulated or communication signals. They may include 4-20 mA current loops, 0–10 volt analog signals, 5 to 12 Vdc digital (TLL) data, analog or digital communications signals, etc. They may also include low-voltage compliance power to instruments such as 5 Vdc, ± 15 Vdc, or 24 Vdc.

P. INTRINSICALLY SAFE CIRCUIT

A circuit in which any spark or thermal effect, produced either normally or in specified fault conditions, is incapable of releasing sufficient electrical or thermal energy to cause ignition of a specific hazardous atmospheric mixture in its most easily ignitable concentration.

Q. JUNCTION BOXES

Junction boxes are electrical enclosures used for combining, splitting, pulling, or redirecting electrical circuits. Junction boxes may terminate one conduit or join multiple conduits. Circuits are not *altered* inside a junction box. Enclosures where circuits are altered are called CONTROL PANELS. With the exception of terminal strips, junction boxes do not contain electrical devices.

1. Junction Boxes, Type J1

Junction boxes identified as TYPE J1 can contain only non-linear power circuits.

2. Junction Boxes, Type J2

Junction boxes identified as TYPE J2 can contain only intrinsically safe circuits.

3. Junction Boxes, Type J3

Junction boxes identified as TYPE J3 can contain only instrumentation circuits that are not intrinsically safe.

Junction boxes not containing circuits of the types identified for TYPE J1, TYPE J2, or TYPE J3 are simply called “junction boxes” (without a TYPE identifier).

R. LFMC

Liquidtight Flexible Metal Conduit (a type of RMC).

S. LINEAR POWER LOADS

Linear power loads are those that are not VFD circuits (both line or load), and are not UV ballast circuits. Although actually non-linear, fluorescent lighting circuits shall be considered linear power loads.

T. POWER CONDUITS

Power conduits contain branch and feeder conductors with voltages 120 Vac and above. These conductors provide operating power to MCCs, panels, motors, lighting, receptacles, HVAC, etc. Conductors can be of #12 AWG wire gauge and larger, either separate or in power cables.

U. PROCESS AREAS

Reference Section 16050, Definitions.

V. PULLBOXES

Pullboxes are underground electrical enclosures, sufficiently sized to allow the entrance of personnel, used for combining, splitting,

pulling, or redirecting electrical circuits. Pullboxes may terminate one conduit or join multiple conduits. A pullbox can be considered an underground junction box.

Circuits are not altered or terminated inside a pullbox. Pullboxes do not contain electrical equipment or devices.

Exception:

- *Pull boxes may include a sump pump.*

Handholes are types of pull boxes but are not sufficiently sized to allow the entrance of personnel (reference HANDHOLES).

W. PVC

Polyvinyl Chloride Conduit (a type of RNC).

X. PVC-RGS

Polyvinyl chloride, externally coated RGS (a type of RMC).

Alias: May be called or shown on Plans and elsewhere in specifications as PVC-Coated RGS or PVC-RMC.

Y. PVC-RMC

Reference PVC-RGS.

Z. RGS

Rigid Galvanized Steel (a type of RMC).

AA. RMC

Rigid Metal Conduit (General NEC Category).

BB. RNC

Rigid Nonmetallic Conduit (General NEC Category).

CC. SURFACE RACEWAYS

A metallic raceway that is intended to be mounted to the surface of a structure, with associated couplings, connectors, boxes, and fittings for the installation of electrical conductors.

DD. VAULTS

A vault is an underground structure, serviceable or accessible only from the top. Handholes, Equipment Vaults, and Pullboxes are considered vaults.

EE. WET LOCATIONS

Reference Section 16050, Definitions.

FF. WIREWAYS

Sheet metal troughs with hinged or removable covers for housing and protecting electric wires and cable in which conductors are laid in place after the wireway has been installed as a complete system.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Provide data for surface raceways, wireways and fittings, hinged-cover enclosures, and cabinets.

1.5 QUALITY ASSURANCE

See Section 16050.

1.6 COORDINATION

Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

Coordinate electrical work with outside utilities associated with the project.

Non electrical piping and structural has priority over underground conduit routing.

Exception:

- *Unless specifically coordinated otherwise with the General Contractor.*

PART 2 PRODUCTS

2.1 METALLIC CONDUIT TYPES

A. FMC

1. Conduit

Flexible, galvanized steel convolutions forming a continuous raceway.

2. Connectors

Galvanized steel, screw in, approved for grounding.

B. IMC

1. Conduit

Hot dipped galvanized with threaded ends meeting ANSI C80.6.

2. Couplings

Steel, cast iron, or malleable iron compression type employing a split, corrugated ring and tightening nut, with integral bushings and locknuts. No indent or set screw type.

a. Couplings

Unsplit, NPT threaded steel cylinders with galvanizing equal to the conduit.

C. LFMC

1. Conduit

Flexible, galvanized steel convolutions forming a continuous raceway, covered by a liquid tight PVC layer. Electri-Flex Type LA or American Sealtite, Type UA

2. Connectors

Galvanized steel, screw in, grounding type with a ferrule, which covers the end of the inside and outside of the conduit.

D. RGS

1. Conduit

Hot dipped galvanized with threaded ends meeting ANSI C80.1.

2. Couplings

Steel, cast iron, or malleable iron compression type employing a split, corrugated ring and tightening nut, with integral bushings and locknuts. No indent or set screw type.

a. Couplings

Unsplit, NPT threaded steel cylinders with galvanizing equal to the conduit.

b. Nipples

Factory made through 8 inches, no running threads.

c. Conduit bodies shall be galvanized, or epoxy coated cast iron or aluminum one piece with galvanized, or epoxy coated cast cover, gasket, and threaded hubs. Use stainless steel screws or other approved non-corroding screws to hold cover in place.

3. Conduit Clamps

Conduit clamps for RGS shall be cast iron.

E. PVC-COATED RGS, PVC-RMC

1. General

a. A proprietary colored urethane coating shall be uniformly and consistently applied to the interior of all

conduit and fittings. This internal coating shall be a nominal 2 mil thickness. Conduit or fittings having areas with thin or no coating shall be unacceptable.

- b. The PVC exterior and urethane interior coatings applied to the conduit shall afford sufficient flexibility to permit field bending without cracking or flaking at temperatures above 30 degrees F (-1 degrees C).
- c. All male and female threads on conduit, elbows, and nipples shall be protected by application of an electronically conducting corrosion resistant compound.
- d. Installation of the PVC coated conduit system shall be performed in accordance with the manufacturer's installation manual.
- e. Conduits and fittings shall meet the following standards:
 - i. ASTM D870
 - ii. ASTM D1151
 - iii. ASTM D3359
 - iv. ASTM D1308
 - v. NEMA RN1

2. Conduit

- a. The PVC coated rigid metal conduit must be UL listed. The PVC coating must have been investigated by UL as providing the primary corrosion protection for the rigid metal conduit. Ferrous fittings for general service locations must be UL listed with PVC as the primary corrosion protection. Hazardous location fittings, prior to plastic coating must be UL listed. All conduit and fittings must be new, unused material. Applicable UL standards may include: UL 6 Standard for Safety, Rigid Metal Conduit, UL 514B Standard for Safety, Fittings for Conduit and Outlet Boxes.

- b. The conduit shall be hot dip galvanized inside and out with hot dipped galvanized threads.

3. Fittings and Accessories

The design shall be equipped with a positive placement feature to ease and assure proper installation. Certified results confirming seal performance at 15 psig (positive) and 25 inches of mercury (vacuum for 72 hours shall be available).

- a. A PVC sleeve extending one pipe diameter or 2 inches, whichever is less, shall be formed at every female fitting opening except unions. The inside sleeve diameter shall be matched to the outside diameter of the conduit.
- b. The PVC coating on the outside of conduit couplings shall have a series of longitudinal ribs 40 mils in thickness to protect the coating from tool damage during installation.
- c. Conduit Form 8 Bodies shall be 1/2 inch through 2-inch diameter, shall have a tongue-in-groove "V-Seal" gasket to effectively seal against the elements. Conduit bodies shall be Form 8 and shall be supplied with plastic encapsulated stainless steel cover screws.
- d. Right angle beam clamps and U bolts shall be specially formed and sized to snugly fit the outside diameter of the coated conduit. All U bolts will be supplied with plastic encapsulated nuts that cover the exposed portions of the threads.
- e. Conduit clamps and fittings for PVC-Coated RGS conduits shall be 316L stainless steel.

4. Approved Material

- a. Plasti-Bond REDH2OT, Perma-Cote, or KorKap manufactured by Robroy Industries.
- b. Ocal-Blue Steel conduit and fittings as manufactured by Ocal, Inc.

- c. Any deviation from the above approved materials must be approved by the Engineer.

2.2 NONMETALLIC CONDUIT TYPES

A. PVC

1. Conduits

NEMA TC 2, Schedule 40 or 80 PVC.

2. Fittings and Accessories

NEMA TC 3; match to conduit type and material, but elbows shall be RMC.

3. Conduit bodies

Where allowed, shall match type, material, and gauge of conduit.

2.3 OUTLET AND DEVICE BOXES

A. STANDARD METAL BOXES

Assembled from stamped steel hot dipped zinc galvanized coated flat pieces, welded or mechanical assembled into a device box, with knockouts for conduit or connector entrance, meeting NEMA OS 1, with plaster or extension rings and necessary mounting appurtenances to suite construction and application.

B. CAST BOXES

1. Cast Aluminum

Epoxy coated cast aluminum box, one piece, with mounting lugs, with threaded holes or hubs, with internal green ground screw and with neoprene gaskets.

2. Cast Iron

Cast iron with electro-galvanized and aluminum acrylic paint finish, one piece, with mounting lugs, with threaded holes or

hubs, with internal green ground screw and with neoprene gaskets.

C. DEVICE COVERS

1. Plastic: Thermoplastic nylon, device-mount, ivory.
2. Aluminum: Sheet Aluminum.
3. Cast Iron: Iron alloy.

D. SWITCH ACTUATORS

1. Aluminum: Lever-arm type, raintight, cast aluminum matching the metallurgy of the device box.
2. Cast Iron: Lever-arm type, raintight, cast iron alloy matching the metallurgy of the device box.

E. WEATHERPROOF COVERS AND PLATES

Weather proof, self-closing, die-cast aluminum, UL listed.

F. IN-SERVICE COVERS

Shall be weather proof and hinged from top with removable cord slots.

2.4 JUNCTION BOXES, HANDHOLES, AND VAULTS

A. JUNCTION BOXES

1. Standard

Stamped steel, deep drawn one piece (without welds or tab connections), galvanized, with knockouts for conduit or connector entrance, meeting NEMA OS 1. Boxes 6" x 6" x 4" or larger may be code gauge fabricated steel continuously welded at seams and painted after fabrication.

2. Cast

Cast iron with electrogalvanized and aluminum acrylic paint finish, one piece, with threaded cover of the same metallurgy and finish, with mounting lugs, with threaded holes or hubs,

with internal green ground screw and with neoprene gaskets; explosion-proof, dust-ignition-proof, raintight, rated for Class I, Division 1 and 2, Groups C, D.

3. Stainless Steel

NEMA 4X 316L stainless steel with gasketed screw down cover.

4. Explosion Proof for Internal Wire Termination

Explosion proof junction boxes shall be 18"H x 12"W x 6"D (minimum inside dimension) cast aluminum; explosion-proof, dust-ignition-proof, raintight, rated for Class I, Division 1 and 2, Groups C, D; Killark #EXB-12186-N34 or equal.

Exception:

- *Unless specifically stated otherwise on the Plans.*

5. Explosion Proof, No Terminations

Cast iron with electrogalvanized and aluminum acrylic paint finish, one piece, with threaded cover of the same metallurgy and finish, with mounting lugs, with threaded holes or hubs, with internal green ground screw and with neoprene gaskets; explosion-proof, dust-ignition-proof, raintight, rated for Class I, Division 1 and 2, Groups C, D.

Exception:

- *Unless specifically stated otherwise on the Plans.*

B. HANDHOLES

1. Material and Strength

Handholes shall be made from Concrete or Polymer Concrete. The boxes and covers are required to conform to all test provisions of ANSI/SCTE 77 2002 "Specification For Underground Enclosure Integrity" for Tier 15 applications (Design Load Vertical 22,500 lbs. and Lateral 800 lbs/sq. ft.) and to be Listed and Labeled. The boxes must physically accommodate and structurally support compatible covers, which possess the Tier rating. In no assembly can the cover

design load exceed the design load of the box. All components in an assembly (box and cover) are to be manufactured by the same manufacturer. All covers are required to have a minimum coefficient of friction of 0.50 in accordance with ASTM C1028. Independent third party verification or test reports stamped by a registered Professional Engineer certifying that all test provisions of this specification have been met are required with each submittal. The cover is to have an identifying function descriptor imprinted on it. The Descriptor shall be ELECTRICAL, CONTROL, SIGNAL, TELEPHONE, STREET LIGHT, or similar approved by the Engineer.

Handholes with metallic lids shall be grounded per Specification Section 16060.

Handhole lid assemblies comprised of steel shall have a factory-applied galvanized finish.

Exception:

- *Unless the assembly is fabricated from stainless steel.*

2. Manufacturers

Quazite (Strongwell Corp.)
Carson Industries

C. PULLBOXES AND VAULTS

Precast concrete structures with preformed knockout holes for conduit entrance. Reference Section 02530, Utility Structures.

Pullboxes and vaults with metallic lids shall be grounded per Specification Section 16060.

Pullbox lid assemblies comprised of steel shall have a factory-applied galvanized finish.

Exception:

- *Unless the assembly is fabricated from stainless steel.*

PART 3 APPLICATION

3.1 CONDUIT BODIES

This section describes the types of raceways, junction boxes, and device boxes that can be used for different circuits and different environments. Reference Section 4.1 for methods and practices required for installation.

A. CABLE AND CONDUIT SCHEDULE

The Cable and Conduit Schedule shall be considered absolute. No changes to wire sizes, wire count, insulation type, circuit type, or conduit size shall be allowed without approval from the engineer.

The Cable and Conduit Schedule does not indicate conduit type (PVC, IMC, RGS, etc.) since, in many cases, a conduit's type may change between its source and destination. The rules stated in this specification define the necessary and allowed conduit type(s) for various applications and routes.

B. RACEWAY REQUIREMENTS

The term "RGS conduits" refers to a type of conduit body and does not imply whether the conduit is PVC-coated or not. Certain applications require RGS conduits with PVC coating, others do not. Reference Section 3.2, "RGS RACEWAY PROTECTIVE COATINGS" for these requirements.

1. Circuit Types and Categories

a. Circuit Types

Conduits are broken into three general circuit types; 1) Power, 2) Control, and 3) Instrumentation (see Definitions).

On the Cable and Conduit Schedule, Power conduits are those starting with the letter "P", Control conduits are those starting with the letter "C", and Instrumentation conduits are those starting with the letter "S".

b. Circuit Categories

Power circuits are broken into two categories, those that contain linear loads and those that contain non-linear loads (see Definitions).

Control and Instrumentation circuits are broken into two categories, those that contain intrinsically safe circuits and those that do not (see Definitions).

These types and categories are listed below in Table 3.1.B.1 below.

c. Relationships Between Circuit Categories and Conduit Types

Many electrical circuit types do not require special conduit routing considerations. However, Table 3.1.B.1 shows three (3) circuit types where the conduit route must be 100 PERCENT CONTINUOUS (reference Definitions).

Table 3.1.B.1

Circuit		
Type	Category	100% Continuous?
Power	Linear	No
Power	Non-linear	Yes
Control	Non-intrinsic	No
Control	Intrinsic	Yes
Instrumentation	Non-intrinsic	Yes
Instrumentation	Intrinsic	Yes

2. Conduit Shape

Wiring shall be routed in pipe or tubular conduits, NOT in fabricated wireways or gutters.

Exception:

- *Unless specifically called out otherwise in the Plans.*

C. PVC SCHEDULE 40 RACEWAY APPLICATIONS

1. All straight portions of conduits completely concealed in walls, attics, concrete, or below ground (not exposed) shall be PVC Schedule 40.

Exceptions:

- *Power conduits containing non-linear loads shall be 100 percent continuous over their entire length.*
- *Control conduits containing intrinsically safe circuits shall be 100 percent continuous over their entire length.*
- *All Instrumentation conduits shall be 100 percent continuous over their entire length.*
- *PVC conduit areas under roads or heavy traffic areas shall be Schedule 80.*
- *Where specifically called out otherwise in the Cable and Conduit Schedule.*

D. RGS RACEWAY APPLICATIONS

1. All conduits requiring 100 percent continuity per Section 3.1.B.1 shall be RGS over their entire length. For coating requirements, reference Section 3.2.

Exception:

- *LFMC conduit shall be allowed per the "LFMC Raceway Applications" section herein.*
2. Underground factory or bent elbows and offsets greater than or equal to 30 degrees shall be RGS.

Exceptions:

- *Where the radius of a conduit bend is greater than or equal to 15 feet per inch of trade size.*
- *Raceways used for the containment and protection of bare grounding electrode conductors shall be PVC*

Schedule 80. Reference PVC Schedule 80 raceway applications.

3. All portions of conduits exposed outdoors shall be RGS.

Exception:

- *All conduits containing grounding electrode conductors shall be PVC Schedule 80 over their entire length.*

4. All portions of conduits under covered structures open on any side shall be RGS.

Exception:

- *All conduits containing grounding electrode conductors shall be PVC Schedule 80 over their entire length.*
- *LFMC conduit shall be allowed per the "LFMC Raceway Applications" section herein.*

5. All portions of conduits exposed on the inside of below-ground pullboxes, equipment vaults, wet wells, and dry wells (vaults) shall be RGS.

Exceptions:

- *All conduits immediately terminating after penetrating a vault wall, that are allowed to be PVC Schedule 40 underground, shall terminate as a PVC conduit bell-end.*

If the conduit is connected inside the vault to any device, conduit body, junction box, control panel, or any other conduit, then all portions of the conduit inside the vault, through the wall penetration, and 24 inches outside the vault shall be RGS and shall be grounded.

- *All conduits containing grounding electrode conductors shall be PVC Schedule 80 over their entire length.*

6. All portions of conduits penetrating concrete floors, walls, or ceilings shall be RGS.

Exception:

- *In below ground vaults as described above.*

7. All conduit penetrations from grade shall be RGS.

Exception:

- *All conduits containing grounding electrode conductors shall be PVC Schedule 80 over their entire length.*

8. All portions of exposed conduits inside closed buildings shall be RGS.

Exceptions:

- *IMC conduit shall be allowed per the "IMC Raceway Applications" section herein.*
- *LFMC conduit shall be allowed per the "LFMC Raceway Applications" section herein.*
- *All conduits containing grounding electrode conductors shall be PVC Schedule 80 over their entire length.*
- *Unless otherwise specifically called out on a separate plan or detail.*

E. LFMC RACEWAY APPLICATIONS (reference Definitions)

1. LFMC conduit shall be used for the last 18 inches of connection to motors, transformers and other vibrating equipment.
2. LFMC conduit shall be used for the last 18 inches of connection to field instruments such as flow meters in vaults and ultrasonic level transducers.
3. LFMC conduit shall be used for the last 18 inches of connection to any device that may require minor movement

during maintenance or repair or that may require physical adjustment.

4. LFMC conduit may be used in pull vaults for connections between conduit penetrations and junction boxes inside the vault where space is limited.

F. IMC RACEWAY APPLICATIONS (reference Definitions)

1. Exposed conduits in dry well shall be IMC.

Exception:

- *LFMC conduit shall be allowed per the “LFMC Raceway Applications” section herein.*

3.2 RGS RACEWAY PROTECTIVE COATINGS

Protected RGS conduits are used to minimize conduit degradation from moisture and chemicals.

Where called in the Plans or Specifications as “Protected RGS,” “PVC-Coated RGS,” “PVC-Coated,” “PVC-RGS,” or “PVC-RMC,” all such conduits, elbows, and fittings shall be factory coated PVC as defined in Section 2.1.

A. PVC-COATED RGS CONDUIT APPLICATIONS

1. All portions of RGS elbows, bends, straight pipes, couplings, and fittings buried underground shall be PVC-Coated.
2. All portions of RGS elbows, bends, straight pipes, couplings, and fittings encased in concrete shall be PVC-Coated.
3. All portions of RGS elbows, bends, straight pipes, couplings, and fittings exposed outdoors shall be PVC-Coated.
4. All portions of RGS elbows, bends, straight pipes, couplings, and fittings inside underground vaults, pullboxes, wet wells, and dry wells shall be PVC-Coated.
5. All portions of RGS elbows, bends, straight pipes, couplings, and fittings exposed in Chemical Rooms (reference Definitions) shall be PVC-Coated.

6. All portions of RGS conduits penetrating concrete floors and below-ground walls and ceilings shall be PVC-Coated at least 12" into the exposed area and extending at least 24" underground.

Exceptions:

- *Where specifically noted to be otherwise in the Plans.*
- *Non-metallic conduits that terminate at the wall of a pullbox.*

3.3 JUNCTION AND DEVICE BOX APPLICATIONS

A. JUNCTION BOXES

1. Junction boxes for Instrumentation, Intrinsically Safe, and Non-Linear Power circuits (see Definitions) shall be hinged steel, 6" x 6" x 4" minimum.
2. Dry Areas (see Definitions).
 - a. Flush-mounted junction boxes may be the standard type.
 - b. Wall-mounted junction boxes shall be the NEMA 1 gasketed.
3. Wet Areas (see Definitions).
 - a. NEMA 4X 316L stainless steel.

Exceptions:

- *Except in pullboxes, cast junction boxes shall be allowed for applications where three conduits or less approach from three different directions and no terminations are made inside the junction box.*
- *Unless called out otherwise on the Plans*

4. Hazardous Areas (see Definitions).
 - a. Junction boxes shall be explosion-proof, dust and ignition-proof, raintight, rated for Class I, Division 1 & 2, Group C, d environments and shall conform to NEC Articles 500 through 517 (reference Section 2.5.A).

B. DEVICE BOXES, ACTUATORS, AND COVERS

All exposed boxes shall be of cast construction.

All aluminum and cast iron covers shall be provided with a weatherproof gasket.

1. Outdoors, In Pullboxes, In Equipment Vaults

a. Receptacles

Cast iron device box body with cast aluminum gasketed cover and top-opening "in-service" cover.

Exception:

- *Cast aluminum device box bodies may be used if specifically called out on the Plans or approved by the Engineer.*

b. Light Switches

Cast iron device box body with cast iron gasketed cover and lever-arm actuator.

Exception:

- *Cast aluminum device box bodies with gasketed die cast aluminum covers and lever arm actuators may be used if specifically called out on the Plans or approved by the Engineer.*

2. Indoor, Wet Areas (see Definitions).

Flush-mounted (recessed) junction boxes may be the standard metal type.

These boxes will usually be mounted in wood or steel stud framed walls with gypsum plasterboard or similar surfacing cover. Boxes mounted in Concrete Masonry Unit (Block) walls shall be Masonry type boxes.

a. Receptacles

- i. Recessed (flush-mount) – standard device box body with gasketed die cast aluminum, snap-action, weatherproof cover.
- ii. Surface-mounted – cast aluminum device box body with gasketed die cast aluminum, snap-action, weatherproof cover.

b. Light Switches

- i. Recessed (flush-mount) – standard device box body with gasketed cast aluminum switch cover.
- ii. Surface-mounted – die cast aluminum device box body with gasketed cast aluminum switch cover.

3. Indoor, Dry Areas (See Definitions)

a. Receptacles

- i. Recessed (flush-mount) – standard device box body with plastic cover.
- ii. Surface-mounted – cast aluminum device box body with plastic cover.

b. Light Switches

- i. Recessed (flush-mount) – standard device box body with plastic switch cover.
- ii. Surface-mounted – cast aluminum device box body with plastic switch cover.

4. Hazardous Areas (see Definitions).
 - a. Explosion proof.

3.4 PULLBOX AND HANDHOLE APPLICATIONS

A. PULLBOXES

Pullboxes shall be provided as shown on the Plans and as required by the Utility Companies.

1. Pullboxes shall be 6' x 6' x 4' deep minimum.

Exceptions:

- *Pullboxes with less than 2 TYPE J1, TYPE J2, or TYPE J3 junction boxes (reference Definitions) shall be allowed to be 4' x 4' x 4' minimum.*
- *Unless specifically called out otherwise on the Plans.*
- *Unless called out otherwise by a Utility Company.*

2. Pullboxes shall be provided with metal H30 hatch lids.

Exceptions:

- *If pullboxes are located where only light load vehicular traffic is present, then the hatch lids shall be rated at H25.*
- *If pullboxes are located where no vehicular load traffic is present, then the hatch lids shall be rated at H20.*

3. Pullbox lids shall be cast, engraved, or otherwise permanently marked with the legend "ELECTRICAL."

B. HANDHOLES

Handholes are used as pull and splice points in underground installations and are typically installed in driveways, parking lots, and off-roadway applications subject to occasional non-deliberate heavy vehicular traffic.

1. Handholes shall be set adjacent to each pole light pedestal.

Exception:

- *Unless specifically shown or called out otherwise on the Plans.*

PART 4 EXECUTION

4.1 EXAMINATION

Examine surfaces and spaces to receive raceways, boxes, for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

4.2 INSTALLATION, GENERAL

A. COORDINATION WITH OTHER WORK

Wherever practical, route conduit with adjacent ductwork or piping.

1. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes or other heat sources operating at temperatures above 100 degrees F.
2. When installing utility conduits, comply with the spacing and depth requirements of the utilities.
3. Non-electrical buried piping has routing priority over electrical burials.

B. MOUNTING PRACTICES

1. All conduits in process areas shall be surface mounted unless specifically called out otherwise on the Plans.
2. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.
3. Where several conduits follow a common route, stagger pull boxes, junction boxes, pulling sleeves, and fittings.

C. DEVICE BOX INSTALLATION

1. Coordinate box locations with building surfaces and finishes to avoid bridging wainscots, joints, finish changes, etc.
2. Recess boxes in the wall, floor, and ceiling surfaces in finished areas. Set boxes plumb, level, square and flush with finished building surfaces within 1/16 of an inch for each condition. Set boxes so that box openings in building surfaces are within 1/8 of an inch of edge of material cut-out and fill tight to box with building materials. Back boxes with structural material to prevent rotation on studs or joists. Use gang boxes wherever more than one device is used at one location.
3. Surface mount boxes to building structures with a minimum of 1/4-inch spacing and with a minimum of two fasteners. Provide attachments to withstand an additional force of 100 pounds applied vertically or horizontally.
4. Set recessed boxes at the following heights to the bottom of the box, except where noted otherwise in the Plan Set:
 - a. Convenience outlet receptacles in finished areas at 18 inches above floor.
 - b. Lighting switches, dimmers, etc., at 42 inches above floor.
 - c. Wall mounted telephones at 60 inches above floor.
 - d. Boxes for outlets on cabinets, countertops, shelves, and above countertops at 2 inches above the finished surface or 2 inches above the back splash. Verify size, style, and location with the supplier or installer of these items before installation.
5. Set surface-mounted receptacle and lighting boxes in wet areas 42 inches above the finished floor to the center of the box, unless called out otherwise in the Plan Set.
6. Set surface-mounted boxes for lighting switches within 12 inches of the door opening on the strike or lock side of the door or on the side closing last unless indicated otherwise in the Plan Set.

7. Arrange boxes used in wet areas to drain moisture away from devices or enclosures for equipment and make conduit connections from below.
8. Set floor boxes level and adjust to finished floor surface.

D. CONDUIT INSTALLATION

Install conduit as a complete and continuous system without wires. Mechanically secure to boxes, fittings, and equipment. Electrically connect conduits to all metal boxes, fittings, and equipment.

1. All field or manufactured ferrous metal threaded connections of conduits and fittings shall be installed with a coating of electrically conductive, corrosion resistant, copper colloidal compound such as "Shamrock Kopr-Shield™ Compound" or equivalent.
2. Keep conduits clean and dry. Close each exposed end.
3. Properly ground each metallic box, cover, lid, hatch, conduit, etc., in compliance with the National Electrical Code and Specification Section 16060.
4. When blowing through conduits, cover electrical components installed in enclosures to avoid blowing dirt, shavings, or moisture into equipment.
5. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel, monofilament plastic line, or woven polyester pull line with not less than 200-lb tensile strength. Leave at least 8 inches of slack at each end of the pull wire.
6. Install exposed raceways in lines parallel or perpendicular to the building or structural member's lines except if structure is not level then follow the surface contours as much as practical. Do not crossover or use offsets if they can be avoided by installing the raceway in a different routing.
7. Run parallel or banked conduits together, on common supports where practical.
8. Make bends in parallel or banked runs concentric (common radius point, expanding radius). Use factory elbows only

where elbows can be installed concentrically; otherwise, provide field bends for parallel raceways.

9. Select surface raceway outlet boxes to which lighting fixtures are attached of sufficient diameter to provide a seat for the fixture canopy.
10. Provide surface metal raceway outlet box and the backplate and canopy at the feed-in location of each end-stem suspension fluorescent lighting fixture.
11. Labeling

With the exception of conduits supplying power to lighting and convenience receptacles, all conduits shall be labeled in the following manner.

- a. Conduits shall be labeled at each entrance and exit of a raceway, box, and device. Labels shall be placed no more than 3 inches from the relevant entrance or exit and shall be positioned in a manner where they can best be read by technicians and maintenance personnel.

Exception:

- *Only one label shall be required for conduits less than 6 feet in length where the entire conduit can be seen from a single point.*
- b. The labels used shall be permanent items manufactured specifically for tagging conduits in direct sunlight and wet environments.
 - c. The conduit label shall be the full conduit number as listed on the Cable and Conduit Schedule.
 - d. The conduit label shall be attached near the ends of conduit stub ups through floors and penetrations into vaults even if equipment is set over the conduit.

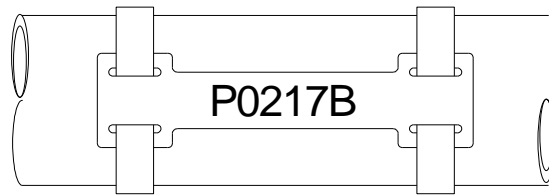


Figure 4.2.D.11

Example of a Conduit Label

E. RACEWAY TERMINATIONS AND CONNECTIONS

1. Join raceways with fittings designed and approved for the purpose and make joints tight.
2. Make connections waterproof and rustproof by application of a watertight, conductive thread compound. Clean threads of cutting oil before applying thread compound.
3. PVC–RMC Conduits

Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.
4. Apply PVC adhesive by brush.
5. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
6. Cut ends of conduit square with hand or power saw or pipe cutter. Ream cut ends to remove burrs and sharp ends. Make conduit threads cut in the field with the same effective length and same thread dimensions and taper as specified for factory-cut threads.
7. Flexible Connections

Use maximum of 18 inches of flexible conduit for equipment subject to vibration, noise transmission, removal, or movement; and for all motors. Do not use flexible conduit in place of elbows, offsets, or fittings to attach to fixed equipment. Use LFMC in wet or damp locations. Do not strap flexible conduit to structures or other equipment.

8. Provide double locknuts and insulating bushings at conduit connections to boxes and cabinets. Align raceways to enter squarely and install locknuts with dished part against the box. Use grounding type bushings where connecting to concentric or eccentric knockouts.

Exception:

- *In wet areas, use Myers hubs.*

9. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.
10. Support conduit connections to motors or other equipment independently of the motor or equipment. Raise or drop vertically to the nearest practicable point of connection to the unit. Run vertical drops to the floor and fasten with a floor flange. Unsupported drops are not permitted. Horizontal runs on the floor or on equipment are not permitted. Drop or raise at the appropriate closest location. Run conduit on equipment frames or supports to closely follow the contours of the equipment. Locate conduit to maintain access to all equipment services and adjustment points and so as not to interfere with operation of the equipment.
11. Connect conduit to hubless enclosures, cabinets, and boxes with double locknuts and with insulating type bushings. Use grounding type bushings where connecting to concentric or eccentric knockouts. Make conduit connections to enclosures at the closest point possible where the devices are located to which the circuits contained in the conduit will connect.

Exception:

- *In wet areas, connect to enclosures, boxes, and devices from the bottom side using Myer-type hubs.*

F. EXPANSION FITTINGS

Where conduits cross building expansion joints, use suitable sliding or offsetting expansion fittings. Unless specifically approved for bonding, use a suitable bonding jumper.

Exception:

- *For 100 percent continuous conduits, provide an LFMC loop to compensate for expansion. Include conduit outlet boxes for maximum bend compliance.*

G. RACEWAY SUPPORT

Support raceways as specified in Section 16050.

1. Provide anchors, hangers, supports, clamps, etc., to support the raceways from the structures in or on which they are installed. Do not space supports further apart than 10 feet.
2. Provide sufficient clearance to allow conduit to be added to racks, hangers, etc., in the future.
3. Support raceway within 3 feet of every outlet box, junction box, panel, fitting, etc.
4. Support raceway and boxes in an approved manner by:
 - a. Expansion shields in concrete or solid masonry;
 - b. Toggle bolts on hollow masonry units;
 - c. Wood screws on wood;
 - d. Metal screws on metal.
5. Raceway in wet areas shall have clamp backs or other appropriate spacers to hold them a minimum of 1/2 inch off the surface. Horizontal runs on the roof surface shall be blocked at every 5 feet to hold them a minimum of 2 inches above roof surface.

H. INSTALLING PVC-COATED RGS CONDUITS

1. Follow the manufacturer's requirements and recommendations when installing PVC-Coated RGS conduits.
2. Seal the connections to protect the conduit.
3. Provide manufacturer's PVC repair compound where the thickness of the conduit coating has been reduced or damaged (from bending, threading, nicking, etc.)

I. BENDS AND OFFSETS

Bend and offset metal conduit with hickey or power bender, standard elbows, conduit fittings or pull boxes. Bending of PVC shall be by hot box bender and, for PVC 2-inches in diameter and larger, expanding plugs. Make elbows, offsets and bends uniform and symmetrical. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

J. PENETRATIONS FOR RACEWAYS

1. Do not bore holes in floor and ceiling joists outside center third of member depth or within 2 feet of bearing points. Holes shall be 1-inch diameter maximum.

Exception:

- *Unless specifically approved by Structural Engineer.*
2. Penetrate through roofs with core drill hole 1/2 to 1 inch larger than conduit, flash with neoprene, caulk conduit in place and seal with silicone sealant under flashing. Sleeve roof opening where non-concrete roof construction occurs.

K. CONDUIT SEAL OFFS

Install raceway seal-off fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, and accessible locations as per NEC Article 500 and fill them with UL-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 seal-off fittings in compliance to NFPA 70 and NFPA 820.

Exceptions:

Seal-off fittings filled with removable compound may be used in non-hazardous applications as listed below to eliminate the possibility of the passage of water or water vapor.

- *Where conduits pass from warm to cold locations.*
- *Where conduits enter or exit buildings below grade.*
- *Where specifically called out on the Plans.*

4.3 PULLBOXES

A. PULLBOX STRUCTURAL INSTALLATION

Strict compliance must be followed regarding the installation of conduits, conductors, junction boxes, and grounding inside pullboxes.

1. Install pullboxes outside of classified areas. Field verify measurements to assure compliance.

Exception:

- *Unless specifically called out otherwise in the Plans.*

B. PULLBOX CONDUIT, CONDUCTOR, JUNCTION BOX, AND GROUNDING INSTALLATION

The six types/categories of electrical circuits as defined in Section 3.1.B.1 shall be installed as described herein (reference Figure 4.3.B).

1. Installing circuits in conduits NOT Identified As 100 percent Continuous in Pullboxes
 - a. Conduits NOT identified as 100 percent continuous shall terminate at the penetration into the pullbox with a PVC Schedule 40 bell-end.

- b. Cables and conductors shall be open-wire within the pullbox.
 - c. Coil 2 wraps at 24 inches per wrap of each open wire. Bind the wraps with Ty-Rap® cable fasteners.
 - d. Support open wires a minimum of 18 inches above the pullbox floor on 316L stainless supports mounted near the edges of the pullbox, leaving room in the center for safe entry, work, and exit. Secure wires with Ty-Rap® cable fasteners.
 - e. Physically separate power and control circuits as much as possible.
 - f. Plug the ends of all open conduits with a removable filler to minimize water entry into and out of the pullbox. Repair plugging after the movement of open wiring.
 - g. Seal around all conduit penetrations with non-shrink grout.
2. Installing Conduits Identified As 100 Percent Continuous in Pullboxes
- a. All conduits identified as 100 percent continuous passing through, or terminating in, a pullbox shall terminate in a TYPE J1, TYPE J2, or TYPE J3 junction box for pulling purposes, termination, and rerouting.
 - b. Provide separate junction boxes for the types of circuits listed below. Under no circumstance shall these circuit types be combined in a common junction box.
 - i. Non-linear power circuits (TYPE J1).
 - ii. Intrinsically safe circuits (TYPE J2). Note: intrinsically safe instrumentation and control circuits may be combined in TYPE J2 junction boxes.

- iii. Instrumentation circuits, not intrinsically safe (TYPE J3).
- c. All conduit entries into junction boxes shall be watertight, made with Myer-type hubs.
- d. All conduits shall be mounted and supported with 316L stainless steel hardware.
- e. Conduit composition and protective coating shall be per Sections 3.1 and 3.2.

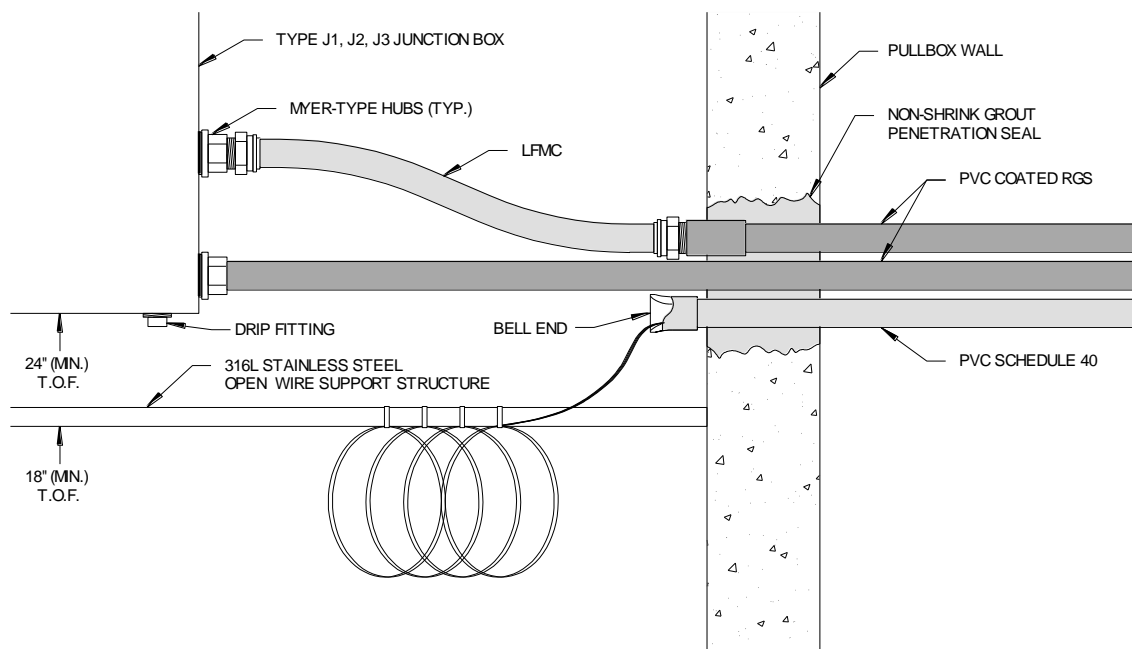


Figure 4.3.B

Typical Conduit Penetrations in Pullboxes

- 3. Installing Junction Boxes in Pullboxes
 - a. Junction boxes shall be NEMA 4X, 316L stainless steel, 18" x 18" x 6" (minimum) and shall comply with NEC 314.28(A)(1) and 314.28(A)(2).
 - b. Junction boxes shall be mounted with 316L stainless steel hardware at a height of 24 inches minimum from the bottom of the junction box to the floor of the pullbox.

- c. Junction boxes shall be mounted on separate walls.
- d. Junction boxes shall be provided with a water drip fitting mounted to the bottom of the box.
- e. Coil 4 wraps at 12 inches per wrap of each cable and conductor in a junction box.
- f. Splicing shall not be allowed in junctions boxes.

Exception:

- *Unless specifically called out otherwise in the Plans.*

4. Installing Grounding in Pullboxes

Reference Specification 16060.

4.4 EQUIPMENT VAULTS

A. EQUIPMENT VAULT INSTALLATION

Install vaults for underground raceway systems true to line and grade. Provide a compacted foundation of 3/8-inch minus crushed rock for the support of the vault. The minimum size for the foundation gravel base is 6 inches greater in each direction of the length and width of the vault and 6-inches deep. Ground vaults as per Section 16060-3.

B. EQUIPMENT VAULT CONDUIT INSTALLATION

Reference Figure 4.4.B.

1. All conduits entering an equipment vault shall terminate in a junction box.

Exception:

- *Unless specifically called out otherwise in the Plans.*

2. Conduit composition and protective coating shall be per Sections 3.1 and 3.2.

3. Conduits NOT identified as 100 percent continuous shall change from PVC to PVC-Coated RGS at least 24 inches before entering the equipment vault.
4. Conduits identified as 100 percent continuous shall terminate in a TYPE J1, TYPE J2, or TYPE J3 junction box.
 - a. Provide separate junction boxes for the types of circuits listed below. Under no circumstance shall these circuit types be combined in a common junction box.
 - i. Non-linear power circuits (TYPE J1).
 - ii. Intrinsically safe circuits (TYPE J2). Note: intrinsically safe instrumentation and control circuits may be combined in TYPE J2 junction boxes.
 - iii. Instrumentation circuits, not intrinsically safe (TYPE J3).
5. All conduit entries into junction boxes shall be watertight, made with Myer-type hubs.
6. All conduits shall be mounted with 316L stainless steel hardware.
7. Conduits entering an equipment vault shall connect to the equipment through a wall-mounted junction box.
8. Conduits shall enter the vault below the junction box and connect to the box through a conduit "T" with a drain fitting as shown. Moisture from the conduit shall not be allowed to enter the junction box.

Exceptions:

- *Conduits in classified vaults shall be provided with a conduit seal-off fitting and may enter the vault at or above the junction box.*
- *Conduits in non-classified vaults may enter the vault at or above the height of a junction box if the conduit "T" with drain fitting is replaced with a conduit seal-off*

fitting. This fitting may be filled with a removable product but shall be properly filled to eliminate the possibility of the passage of water or water vapor.

9. Seal around all conduit penetrations with non-shrink grout.

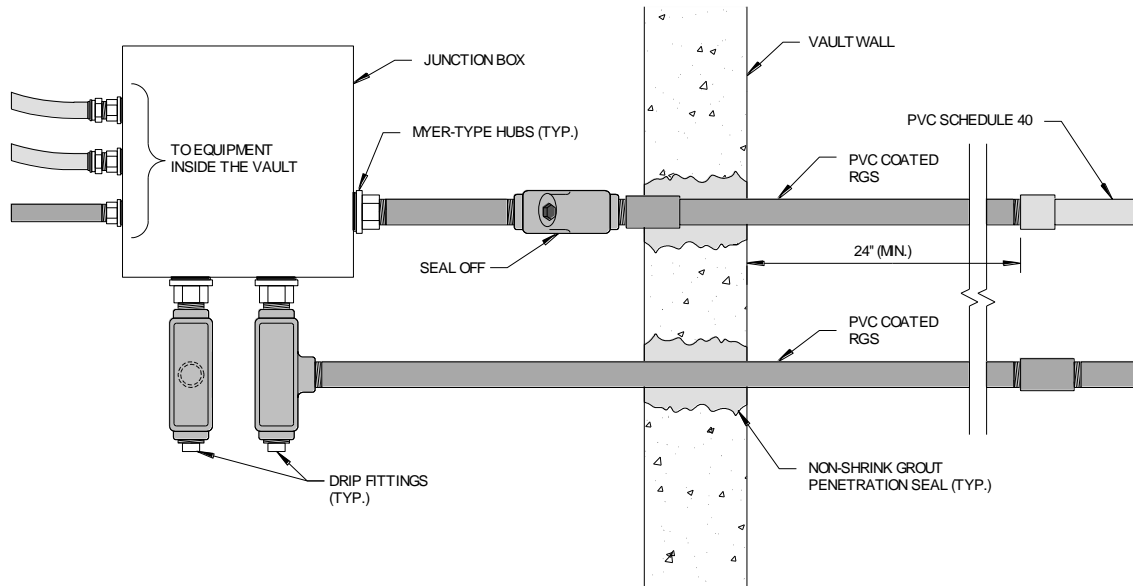


Figure 4.4.B

Typical Conduit Terminations in Equipment Vaults

C. EQUIPMENT VAULT JUNCTION BOX INSTALLATION

1. Junction boxes shall be NEMA 4X, 316L stainless steel, 12" x 12" x 6" (minimum) and shall comply with NEC 314.28(A)(1) and 314.28(A)(2).
2. Junction boxes shall be mounted with 316L stainless steel hardware at a height of 24 inches minimum from the bottom of the junction box to the floor of the vault.
3. Coil 4 wraps at 12 inches per wrap of each cable and conductor in a junction box.

D. EQUIPMENT VAULT GROUNDING INSTALLATION

Reference Specification 16060, Grounding and Bonding.

E. CONNECTIONS TO THE EQUIPMENT

1. LFMC conduit shall be provided from the wall to the equipment.

4.5 HANDHOLES

A. HANDHOLE INSTALLATION

Install handholes for underground raceway systems true to line and grade. Provide a compacted foundation of fine sand or 3/8 minus crushed rock for the bearing surface edges of the handholes.

The handholes shall be installed per the NEC sections 314, and other applicable sections of the NEC.

B. HANDHOLE CONDUIT INSTALLATION

1. End all conduits with a vertical riser.
2. Conduits NOT identified as 100 percent continuous shall be allowed to extend into the handhole as a PVC conduit. Provide a PVC bell-end in each conduit as shown in Figure 4.5.B.2. Provide a removable filler at the end of each conduit to eliminate the possibility of water entry.

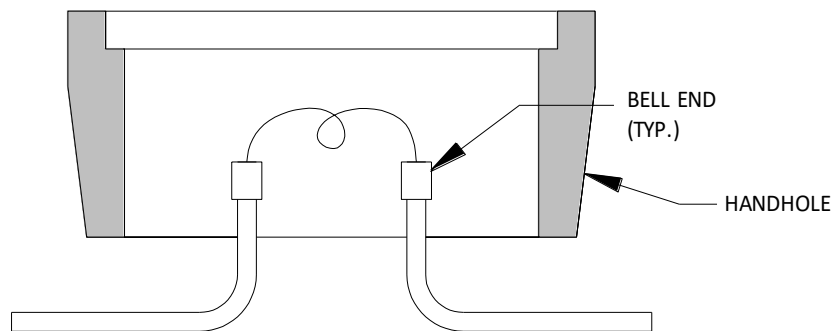


Figure 4.5.B.2

Typical PVC Conduit Terminations in a Handhole

3. Conduits identified as 100 percent continuous shall terminate into the bottom of a TYPE J1, TYPE J2, or TYPE J3 junction box, with Myer-type hubs, in PVC-Coated RGS conduit as shown in Figure 4.5.B.3. The door of the J-Box shall face upwards.

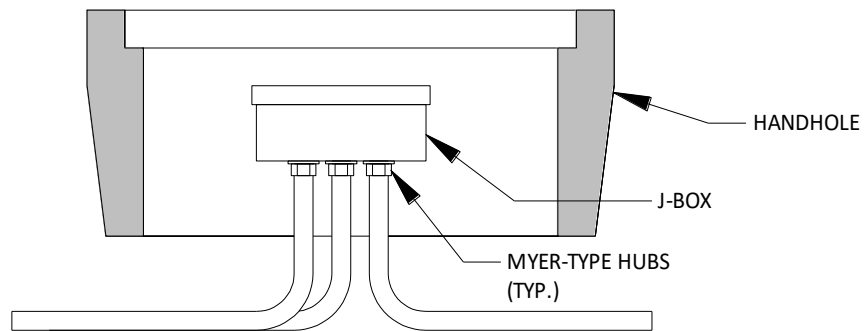


Figure 4.5.B.3

Typical 100 Percent Continuous Conduit Terminations in a Handhole

Exception:

- *Where a handhole contains only two conduits, and is being used solely as a pulling point, where one conduit is simply an extension of the other, a junction box may be replaced with a PVC-Coated RGS conduit pulling body.*

C. HANDHOLE GROUNDING

1. All handholes with metal conduits or with metal lids shall be grounded per Section 16060-3.

4.6 INSTALLATION OF CONDUITS UNDERGROUND AND IN CONCRETE

A. UNDERGROUND RACEWAYS

1. The minimum conduit depth shall be 24 inches.

Exceptions:

- *Electrical utility conduit depth shall be 36 inches.*
- *Unless required otherwise by utility company.*
- *Unless required to be shallower due to physical constraints (see requirements below).*

- *Unless under a concrete slab (see requirements below).*
 - *Conduits contains a grounding electrode conductor shall be 30-inches deep.*
2. Conduits that require a buried depth of less than 18 inches shall require a 6-inch-thick concrete covering over that portion of such conduits. Such concrete covers need not be formed but shall be colored red or shall be painted red on top.
 3. Conduits under a concrete slab-on-grade shall be separated from the slab and from the supporting soil by at least 3 inches with soft sand on all sides.
 4. Provide separation of underground instrumentation conduits from power and control conduits by a minimum of 12 inches. Avoid parallel runs of instrumentation conduits with power and control conduits as much as possible. Where instrumentation conduits are required to crossover power or control conduits, maintain the 12-inch separation using depth and make the crossover as close to 90 degrees as possible.

Exception:

- *Provide 18 inches of separation between instrumentation conduits and non-linear power conduits.*
5. Run conduits as straight as practicable. Make changes in direction and/or grade of sufficient length to allow a gradual change (3-foot radius minimum). Make slight offsets with 5-degree couplings.
 6. Run trenches true and clear of stones or soft spots. Place 4-inches of fine sand in the trench bottom and tamp into place. Provide preformed plastic spacers on top of sand spaced 5-feet on center.

After the raceway is placed in the trench, backfill 6 inches with sand, then with native earth backfill passing a No. 8 sieve, free of stones. Do not tamp on top of the conduit until the final backfill is placed. Tamp or water-settle the final

backfill to finish the grade. Compact the backfill as specified under Section 02300 "Site Earthwork."

7. Mark direct buried conduit by placing a red marking tape a minimum of 12 inches below grade during backfilling of the trench.
8. Seal conduit connections to eliminate leakage.

B. CONCRETE ENCASED RACEWAYS

Raceways encased in structural concrete must be defined in detail and presented to the Structural Engineer for approval at least 7 days prior to installation. As a minimum, approval will be based on the assurance that there will be no physical interference and that structural integrity will not be jeopardized.

1. In general, conduits encased in concrete may take the most direct route providing they do not jeopardize the structural integrity of the slab or interfere with process-related piping or equipment.
2. Conduits shall be at least 1-1/2 inches to the edge of a concrete body. If a structural block-out is desired for conduit bundling near the edge of a concrete body, then submit the desired layout to the Engineer for approval and design as defined in this Section.
3. Conduit density, crossover, and routing must be minimized and coordinated to assure that structural integrity is not jeopardized.
4. At the point-of-exposure out of the slab, conduits must be perpendicular to the slab surface from all angles.
5. No part of an elbow's bending radius shall be seen at the point-of-exposure from the slab.

C. CONDUITS IN ELEVATED SLABS

See "CONCRETE ENCASED RACEWAYS" above.

D. CONDUITS UNDER SLABS ON GRADE

1. No conduits will be encased in slabs less than 8 inches in depth.
2. For slabs-on-grade, all conduits larger than 3/4-inch trade size must be run underground below the slab.
3. All conduits desired to be installed within slabs on grade shall be submitted to the Engineer for approval and design as defined in this Section.

Exceptions:

- *Conduits shown on the Plans as being designed into slabs on grade do not require further Engineering approval.*

E. CONDUIT TRANSITIONS

Where raceway exits from grade or concrete, provide the following:

1. All conduits exiting grade or concrete shall be PVC-Coated RGS.

Exception:

- *Raceways used for the containment and protection of bare grounding electrode conductors shall be PVC Schedule 80. No portion of these conduits shall be metallic.*
2. For equipment to be moved into place at a later date, install a PVC-Coated RGS coupling flush with the floor slab. Insert a threaded flush plug into the coupling. Provide a pull wire looped backed into the conduit that can be reached after removal of the plug.
 3. Only the straight portion of conduits shall exit grade or concrete. No curved portion of a factory or field-bent conduit shall be visible existing the penetration, even when covered or hidden by equipment.

F. CONDUIT STUB-UPS INTO EQUIPMENT AND ENCLOSURES

1. Where conduits are stubbed up into open bottom equipment and enclosures, extend the bottom of the conduit threads 1/2 inch above grade. Provide ground bushing and end fittings, flush with fitting and 2-inch stub, above the bottom of the enclosure. Stub conduits to a uniform height (plus or minus 1/8 of an inch) and align within plus or minus 1/4 inch.

Exception:

- *Conduits that do not meet the requirements of being 100 percent continuous, stubbing up directly under a Motor Control Center that is mounted on a housekeeping pad, shall be allowed to terminate as a PVC conduit with a bell-end.*
2. Locate stub-ups directly under the section gutter into which the conductors they contain are to be routed. Terminate conduit with insulating, grounding type bushing bonded to the ground bus of the equipment.
 3. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends are not visible above the finished slab.
 4. Unless otherwise noted on the Plans, spare conduits stubbing up through concrete floors shall be finished flush with floor with an RGS coupling. Provide an in-set metal plug (male thread) into coupling flush with floor.
 5. Provide conduit labels to these stub-ups.

4.7 PROTECTION

Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensures coatings, and finishes are without damage or deterioration at the time of Substantial Completion.

- A. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
- B. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

4.8 CLEANING

On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

4.9 QUALITY CONTROL

A. TESTS

1. Conduits identified as meeting the requirements of 100 percent continuity shall be tested between source and destination as follows:
 - a. Testing shall be performed using a Digital Voltmeter or Biddle ohmmeter.
 - b. Testing values shall not exceed 5 ohms.
 - c. If testing values exceed 5 ohms, then corrective action shall be taken to reduce the resistance to 5 ohms or below.
 - d. These measurements shall be documented, signed, and submitted to the Engineer for approval.

***** END OF SECTION *****

SECTION 16140
WIRING DEVICES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section includes the various types of receptacles, connectors, switches, and finish plates.

1.2 RELATED WORKS SPECIFIED ELSEWHERE

<u>Section</u>	<u>Items</u>
01300	Submittals
16050	Basic Electrical Materials and Methods
16130	Raceways and Boxes

1.3 QUALITY ASSURANCE

See Section 16050.

1.4 COORDINATION

A. WIRING DEVICES FOR OWNER FURNISHED EQUIPMENT

Match devices to plug connectors for Owner-furnished equipment.

B. CORD AND PLUG SETS

Match cord and plug sets to equipment requirements.

1.5 DEFINITIONS

Reference Section 16050, "Definitions."

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. AVAILABLE MANUFACTURERS

Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include the following:

1. Wiring Devices
 - a. Arrow Hart Div., Cooper Industries.
 - b. Bryant Electric, Inc.
 - c. Hubbell Inc.
 - d. Killark Electrical Mfg. Co.
 - e. Leviton Mfg. Co., Inc.
 - f. Pass & Seymour/Legrand.
2. Multi-Outlet Assemblies
 - a. Wiremold Co.

2.2 WIRING DEVICES

Comply with NEMA Standard WD 1, "General Purpose Wiring Devices."

A. ENCLOSURES

NEMA 1 equivalent, except as otherwise indicated.

B. COLOR

Ivory except as otherwise indicated or required by Code.

C. RECEPTACLES, STRAIGHT-BLADE AND LOCKING TYPE

Except as otherwise indicated, comply with Federal Specification W-C-596 and heavy-duty grade of UL Standard 498, "Electrical Attachment Plugs and Receptacles." Provide NRTL labeling of devices to verify compliance.

1. General Purpose Convenience Outlets
 - a. Duplex receptacle configuration
 - b. Nylon face
 - c. Staked screw terminals for line, neutral, and ground connections.
 - d. Provisions for split bus
 - e. NEMA 5-20R
2. Special Purpose Receptacles
 - a. Staked screw terminals for line, neutral, and ground connections.
 - b. NEMA configuration as indicated.

D. RECEPTACLES, STRAIGHT-BLADE, SPECIAL FEATURES

Comply with the basic requirements specified above for straight-blade receptacles of the class and type indicated, and with the following additional requirements:

1. Ground-Fault Circuit Interrupter (GFCI) Receptacles

UL Standard 943, "Ground Fault Circuit Interrupters," with integral NEMA 5-20R duplex receptacle arranged to protect only the connected receptacle and no other receptacles connected on the same circuit. Design units for installation in a 2-3/4-inch-deep outlet box without an adapter.

E. RECEPTACLES, INDUSTRIAL HEAVY-DUTY

Conform to NEMA Standard PK 4 "Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type for Industrial Use."

Refer to Specification Section 16230 for pin and sleeve generator receptacles.

F. RECEPTACLES IN HAZARDOUS (CLASSIFIED) LOCATIONS

Comply with NEMA Standard FB 11 "Plugs, Receptacles, and Connectors of the Pin and Sleeve Type for Hazardous Locations" and UL Standard 1010 "Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations."

120 VAC, 1 PH, 20 A and less, receptacles used in Class I, Divisions 1 and 2 areas, shall be dead-front, delayed action, circuit breaking type, rated for use in Class I, Division 1 and 2, Groups B, C, and D areas. These receptacles shall be rated NEMA 3, 7BCD, 9FG, and 12 and shall be suitable for use in explosion proof, dust-ignition proof, and raintight applications. Receptacles shall be rated 20 A, 125 VAC with 3/4" hubs; Crouse-Hinds #ENR 21201 with ENP 5201 plug, or equivalent.

G. PENDANT CORD/CONNECTOR DEVICES

Matching, locking type, plug and plug receptacle body connector, NEMA L5-20P and L5-20R, heavy-duty grade.

1. Bodies

Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.

2. External Cable Grip

Woven wire mesh type made of high-strength galvanized-steel wire strand and matched to cable diameter and with attachment provision designed for the corresponding connector.

H. CORD AND PLUG SETS

Match voltage, current ratings, and number of conductors to requirements of the equipment being connected.

1. Cord

Rubber-insulated, stranded copper conductors, with type SOW-A jacket. Grounding conductor has green insulation. Ampacity is equipment rating plus 30 percent minimum.

2. Plug

Male configuration with nylon body and integral cable-clamping jaws. Match to cord and to receptacle type intended for connection.

- I. SNAP SWITCHES

Quiet-type ac switches, NRTL listed and labeled as complying with UL Standard 20 "General Use Snap Switches," and with Federal Specification W-S-896.

1. Lighting Switches

120/277 Vac only, rated 20 amperes.

2. Motor Rated Switches

Horsepower rated for application indicated.

- J. WALL PLATES

Single and combination types that mate and match with corresponding wiring devices. Features include the following:

1. Color

Matches wiring device except as otherwise indicated.

2. Plate-Securing Screws

Metal with heads colored to match plate finish.

3. Material for Interior Finished Spaces

Lexan, except as otherwise indicated.

4. Material for Interior Unfinished Spaces: Galvanized steel.

5. Material for Laboratories: Stainless steel.

6. Material for Exterior or Wet Locations: Cast Aluminum.

K. LIMIT SWITCHES

Limit switches shall be Allen Bradley 802T with 1-inch wide adjustable lever and 3/4-inch nylon roller or equal.

L. FLOOD SWITCHES

Flood switch shall be Gems LS-3 single-point level switch or equal.

2.3 MULTI-OUTLET ASSEMBLIES

A. Comply with Standard UL 5, "Surface Metal Raceways and Fittings."

B. COMPONENTS OF ASSEMBLIES

Products of a single manufacturer designed to be used together to provide a complete matching assembly of raceways and receptacles.

C. RACEWAY MATERIAL

Metal, with manufacturer's standard corrosion-resistant finish.

D. WIRE

No. 12 AWG.

PART 3 EXECUTION

3.1 INSTALLATION

A. IDENTIFICATION

Each receptacle, whether convenience, or dedicated, shall be labeled with the circuit from which its power is derived. Label as "CKT-XX" where XX = numerical circuit number

1. Only one Panelboard servicing the site:

Label as "CKT-XX" where XX = numerical circuit number within the Panelboard.

2. More than one Panelboard servicing the site:

Label as “CKT XX-YY” where XX = Panelboard number and YY = numerical circuit number within the Panelboard.

Example:

A receptacle powered from circuit 03 of Panelboard [01 PB 02] would be labeled “CKT 02-03”

B. RECEPTACLE BOXES

1. Reference Section 16130 for box types.

2. Mounting Height

- a. Indoor, in DRY Areas

Indoor receptacle boxes in DRY areas shall be mounted 12 inches above the floor unless shown otherwise on the Plans.

- b. Indoor, in WET Areas

Indoor receptacle boxes in WET areas shall be mounted 42 inches above the floor unless shown otherwise on the Plans.

- c. Outdoor

Outdoor receptacle boxes shall be mounted 18 inches above grade unless shown otherwise on the Plans.

3. Reference Section 16130 for box cover types.

C. CONVENIENCE RECEPTACLES

Convenience receptacles shall be 20 A, duplex, white, GFCI, straight blade, 3-wire, grounding, unless called out otherwise on the Plans.

In addition to any GFCI requirements, all receptacles, convenience or dedicated, located in break rooms and kitchens shall be AFCI.

D. DEDICATED RECEPTACLES

Dedicated receptacles shall be 20 A, simplex, gray, non-GFCI, straight blade, 3-wire, grounding, unless called out otherwise on the Plans.

Power must be connected to a dedicated GFCI breaker in the panelboard.

In addition to any GFCI requirements, all receptacles, convenience or dedicated, located in break rooms and kitchens shall be AFCI.

Dedicated receptacles shall include a red phenolic placard with 3/8-inch lettering over the receptacle stating:

NON-GFCI RECEPTACLE FOR (<i>specific device</i>) NOT INTENDED FOR GENERAL USE

E. ARRANGEMENT OF DEVICES

Except as otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on bottom. Group adjacent switches under single, multigang wall plates.

1. See "Raceways and Boxes" Section for mounting height of devices.
2. Verify locations of outlets and switches in cabinetry with cabinet supplier and Owner prior to installation.

F. INSTALLATION PRACTICES

1. Install devices and assemblies plumb, level, flush and secure. Provide spacers on device screws to flush yokes or flanges to surface of wall within 1/16 of an inch where boxes are not flush with the wall surface. Install wiring devices such as receptacles to withstand 50 pounds force applied perpendicular to the device face with a maximum deflection of 1/16 of an inch.
2. Protect devices and assemblies during painting.

3. Use corrosion resistant devices in kitchen areas and outdoors.
3. Wiring connections shall be made by compression on the screw terminals. The wire shall be neatly and symmetrically wrapped around the screw a minimum of 180 degrees.

G. LIGHT SWITCH ORIENTATION

Install switches with the "off" position down. Install three and four way switches so the load is "off" when all switch handles are down.

H. TERMINATION PRACTICES

Connect phase, neutral, and grounding wires to devices with full loops around screws installed to tighten with tightening of the screw. Trim insulation to within 1/8 of an inch of screw terminal.

I. WALL PLATES

Install after painting is complete. Install with an alignment tolerance of 1/16 of an inch to plumb. Install at flush mounted devices so that all four edges are in continuous contact with finished wall surface without the use of mats or similar devices. Do not use plaster fillings.

3.2 GROUNDING

Connect receptacle or switch ground lug to device box for devices other than isolated ground type.

3.3 FIELD QUALITY CONTROL

Test wiring devices for proper connections, polarity, and ground continuity. Perform this testing with testing equipment designed for testing polarity and connections.

Operate each operable device at least six times.

Test ground-fault circuit interrupter operation with local fault simulations, using a tester designed for such testing, and according to manufacturer recommendations. Testing with integral test switches on the receptacle is not sufficient for this testing.

Replace damaged or defective components, and retest.

***** END OF SECTION *****

SECTION 16210

ELECTRICAL UTILITY SERVICES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section consists of electrical service modification to the commercial power utility system (Power Company) and the work required in conjunction with the Power Company for their revenue metering. For this project the Power Company is Seattle City Light.

1.2 RELATED WORKS SPECIFIED ELSEWHERE

<u>Section</u>	<u>Items</u>
01500	Temporary Facilities
16050	Basic Electrical Materials and Methods
16060	Grounding and Bonding
16120	Conductors and Cables
16130	Raceway and Boxes

PART 2 PRODUCTS

2.1 MATERIALS

- A. Revenue metering: provided by the Power Company.
- B. Meter socket: provided by the Owner.
- C. Splice vault and secondary conduit and conductor: provided by the Contractor.

PART 3 EXECUTION

3.1 APPLICATION

The Contractor shall make application for service modification to the Power Company on the Owners behalf. A lump sum bid item has been added to the bid proposal for purposes of bid evaluation. Contractor shall be paid the actual invoice cost from the Power Company.

Coordinate with the Power Company to ensure that their metering and service requirements are met.

- A. The Contractor is responsible for any work necessary to place the modified service in operation as a complete installation. Provide any materials required and do any work necessary that is not provided or completed by the Power Company.
- B. Pay any service charges or construction fees required for the electrical services to the Project.
- C. Provide excavation and backfill for the Power Company's circuits and vaults. Locate the trench for such circuits as directed by the utility.
- D. Provide excavation, for vaults and conduits, to utility requirements.

3.2 INSTALLATION

- A. The Power Company will:
 - 1. Install the revenue meter.
 - 2. De-energize and energize the circuit to the meter base
- B. The Contractor is responsible to provide and/or install the following:
 - 1. Excavation for vaults/junction boxes, splices, and trench associated with the Secondary circuit.
 - 2. Secondary conductors from the utility transformer to the service disconnect.

***** END OF SECTION *****

SECTION 16230

GENERATOR ASSEMBLIES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section consists of a packaged diesel engine generator set [01 GEN 01] with accessories as specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
15050	Piping Systems
15066	Pipe and Conduit Support System
15150	Diesel Generator Fuel System
15550	Generator Engine Exhaust System
16050	Basic Electrical Materials and Methods
16060	Grounding and Bonding
16410	Enclosed Switches and Circuit Breakers

1.3 DEFINITIONS

A. FULL LOAD

The generator delivering 100 percent of its rated output power.

B. MAXIMUM FREQUENCY DIP AND PEAK

The maximum allowable frequency deviation, in percent, below and above the generator's specified output frequency during application-specific starting and stopping steps as specified in 1.6.A.

Example: A 10 percent MAXIMUM FREQUENCY DIP AND PEAK on a 480 Vac, 3 PH, 60 Hz generator equates to ± 10 percent (± 6 Hz) maximum deviation from 60 Hz, or 54 Hz absolute minimum to 66 Hz absolute maximum frequency limits during the worse-case specified step changes while either loading or unloading.

C. MAXIMUM FREQUENCY RECOVERY TIME PERIOD

The maximum period of time, in seconds, for the frequency to recover back to its specified steady-state operating band following load transitions from no load to full load or from full load no load.

Example: A 5 second MAXIMUM VOLTAGE RECOVERY TIME PERIOD requires that the generator repeatedly recover from full load added or removed load steps within 5 seconds maximum. This means that during a full load transition, in either direction, the generator frequency may deviate from its specified steady-state operating band for a maximum of 5 seconds before it has fully recovered back to its specified steady-state operating band.

D. MAXIMUM STEADY-STATE FREQUENCY OPERATING BAND

The maximum allowable frequency deviation, in percent, below and above the generator's specified operating frequency during steady-state operating conditions at any load between no load and full load.

Example: 0.5 percent MAXIMUM STEADY-STATE FREQUENCY OPERATING BAND on a 480 Vac, 3 PH, 60 Hz generator equates to ± 0.5 percent (± 0.3 Hz) maximum deviation from 60 Hz, or 59.7 Hz absolute minimum to 60.3 Hz absolute maximum frequency limits at any stable operating load from no load to full load.

E. MAXIMUM VOLTAGE DIP AND PEAK

The maximum allowable voltage deviation, in percent, below and above the generator's specified output voltage during application-specific starting and stopping steps as specified in 1.6.A.

Example: 25 percent MAXIMUM VOLTAGE DIP AND PEAK on a 480 Vac, 3 PH, 60 Hz generator equates to ± 25 percent (± 120 Vac) maximum deviation from 480 Vac, or 360 Vac absolute minimum to 600 Vac absolute maximum voltage limits during the worse-case specified step changes while either loading or unloading.

F. MAXIMUM VOLTAGE RECOVERY TIME PERIOD

The maximum period of time, in seconds, for the voltage to recover back to its specified steady-state operating band following load transitions from no load to full load or from full load no load.

Example: A 5 second MAXIMUM VOLTAGE RECOVERY TIME PERIOD requires that the generator repeatedly recover from full load added or removed load steps within 5 seconds maximum. This means that during a full load transition, in either direction, the generator voltage may deviate from its specified steady-state operating band for a maximum of 5 seconds before it has fully recovered back to its specified steady-state operating band.

G. MAXIMUM STEADY-STATE VOLTAGE OPERATING BAND

The maximum allowable voltage deviation, in percent, below and above the generator's specified operating voltage during steady-state operating conditions at any load between no load and full load.

Example: 2 percent MAXIMUM STEADY-STATE VOLTAGE OPERATING BAND on a 480 Vac, 3 PH, 60 Hz generator equates to ± 2 percent (± 9.6 Vac) maximum deviation from 480 Vac, or 470.4 Vac absolute minimum to 489.6 Vac absolute maximum voltage limits at any stable operating load from no load and full load.

H. NO LOAD

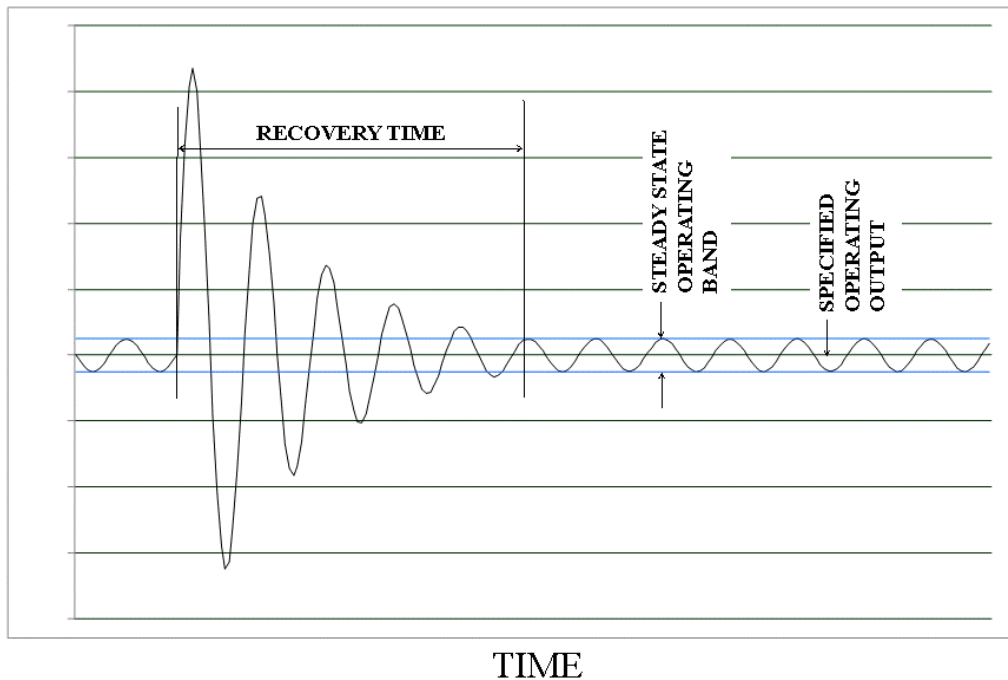
The generator delivering 0 percent of its rated output power.

I. STANDBY POWER OUTPUT RATING

The power output rating equal to the power the generator set delivers continuously under normally varying load factors for the duration of an electrical utility power outage. The power output rating is the gross electrical power output of the generator set minus the total power requirements of the electric motor driven cooling fan, water pump, and other auxiliary loads related to the generator set operations.

J. DEFINITIONS REFERENCE GRAPH

The following graph is a reference chart to better define the following terms “MAXIMUM VOLTAGE RECOVERY TIME PERIOD,” “MAXIMUM STEADY-STATE VOLTAGE OPERATING BAND”, “MAXIMUM FREQUENCY RECOVERY TIME PERIOD,” and “MAXIMUM STEADY-STATE FREQUENCY OPERATING BAND.” The Y axis can either be voltage or frequency and the X axis is time.



1.4 REFERENCES

- A. The latest Washington State adopted, published edition of a reference shall be applicable.
- B. All Washington State amendments adopted prior to the effective date of this Contract shall be applicable.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. National Fire Protection Association (NFPA)
 - a. NFPA 30 Flammable and Combustible Liquids Code
 - b. NFPA 37 Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
 - c. NFPA 70 National Electrical Code
 - d. NFPA 110 Standard for Emergency and Standby Power Systems.
 - e. NFPA 704 Hazardous Identification System.
2. International Fire Code (IFC)
3. International Building Code (IBC)
4. National Electrical Manufacturers Association (NEMA)
 - a. NEMA MG 1: Motors and Generators
5. International Mechanical Code (IMC)
6. Underwriters Laboratory (UL)
 - a. UL 2200 Generator Engine Generator Assemblies
 - b. UL 142 Steel Aboveground tanks for Flammable and combustible Liquids.

1.5 PERFORMANCE REQUIREMENTS

- A. The standby power output rating shall be 125 kW at 80 percent power factor at 480/277 volts, 3 phase, 60 hertz while operating under the site conditions listed in Part 1.8 of this Section in an ambient temperature range of 0 to 104 degrees F at less than 90 percent rated capacity.

The Generator shall be suitable for operation with pulse width modulated variable frequency drives (connected as loads as shown on the Plans and operating motors throughout a speed range of 6 to 60 hertz) without detrimental effects on voltage or frequency regulation and stability.

- B. MAXIMUM VOLTAGE DIP AND PEAK
Shall not exceed 25 percent.
- C. MAXIMUM FREQUENCY DIP AND PEAK
Shall not exceed 10 percent.
- D. MAXIMUM STEADY-STATE VOLTAGE OPERATING BAND
Shall not exceed 2 percent.
- E. MAXIMUM STEADY-STATE FREQUENCY OPERATING BAND
Shall not exceed 0.5 percent.
- F. MAXIMUM VOLTAGE RECOVERY TIME PERIOD
Shall not exceed 5 seconds.
- G. MAXIMUM FREQUENCY RECOVERY TIME PERIOD
Shall not exceed 5 seconds.
- H. ALTERNATOR OUTPUT WAVEFORM
At no load, harmonic content measured line-to-line or line-to-neutral does not exceed 5 percent total and 3 percent for single harmonics. The telephone influence factor, determined according to NEMA MG 1, does not exceed 50.
- I. SUSTAINED SHORT-CIRCUIT CURRENT
For a 3-phase, bolted short circuit at the system output terminals, the system will supply 300 percent of rated full load current for not less than 10 seconds to coordinate circuit breaker tripping. This system shall include over-voltage relay protection to preclude damage to any generator system component.
- J. TEMPERATURE RISE OF GENERATOR
Within limits permitted by NEMA MG 1, when operating continuously at full nameplate rating, the temperature rise of the generator shall not exceed 250 degrees F over 100 degrees F ambient.

K. STARTING TIME

The maximum allowable time period to cold start the generator, while operating at the low end of the specified temperature range, and have its voltage and frequency sufficiently stable for a transfer switch to accept or automatically initiate a power transfer, shall be 10 seconds.

1.6 SUBMITTALS

For each generator set submit under provisions of Section 01300 and as specified herein.

A. PRODUCT DATA

Provide the manufacturer and a full description of the generator set and associated components. Include features, ratings, and performance including, but not limited to:

1. Engine
 - a. Horsepower at rated speed and load.
 - b. Emission Ratings.
 - c. Lubrication oil capacity
2. Overall dimensions of generator set system including the sub-base fuel tank, and the enclosure.
3. Fuel consumption for 1/4, 1/2, 3/4, and full load of generator set
4. Electrical governor
5. Coolant heater
6. Alternator
 - a. Electrical rating (kVA, reactance, time constants, temperature rise, etc.).
7. Voltage regulator type, make, model, and wiring diagram

8. Noise levels at twenty-three feet (7 meters) in a free field
9. Exhaust pipe and muffler sizing backpressure calculations
10. Warranty and Service Agreement documentation
11. Vibration isolation calculations, Plans and seismic certification from manufacturer per the seismic information listed in Part 1.8B of this Section.
12. Bill of Materials
13. Wiring Diagram

B. QUALITY ASSURANCE

Provide documentation showing all CD&Es (compliances, deviations, and exceptions) for this Specification.

C. OPERATION AND MAINTENANCE MANUAL

1. Field Test Reports

Indicate and interpret test results for compliance with manufacturer's published standards for unit provided. Provide written approval of installation in accordance with all manufacturers' recommendations.

2. Operation and Maintenance Data

Provide information to be included in the operation and maintenance equipment manuals specified in Section 01300, Section 11000, and as specified herein.

3. Test Reports

The O&M manual shall include a copy of the factory test data and the field test report.

4. Service Agreement and Warranty

Include copies of the Service Agreement and Warranty in the Operation and Maintenance Manual.

1.7 QUALITY ASSURANCE

See Section 16050.

A. SOURCE LIMITATIONS

Obtain engine generator set from a single supplier with responsibility for the complete system. Furnish a new product built from components with proven reliability and compatibility. The generator set shall be coordinated to operate as a unit as evidenced by records of prototype testing by the OEM.

The warranty shall be supported by the original distributor, not offset to an engine manufacturer, an alternator manufacturer, or a new manufacturer's distributor.

The local representative for the generator manufacturer shall have the minimum qualifications and meet the minimum requirements:

1. Shall have represented the product for a minimum of 5 years.
2. Shall provide, on request, a reference list of five similar projects, no older than 2 years, with site contact information.
3. Shall provide formal classroom training for service and maintenance of generators and transfer switches on a regular basis. The schedule and pricing for this training shall be available on request. The training shall be conducted in a location that is within a 1 day drive of the job site.
4. Shall have a field service group, with no fewer than 10 qualified field service technicians, dedicated to generator repair and maintenance with dedicated service vehicles, parts, and tooling needed for general maintenance and common repairs.
5. Shall have qualified field service technicians with a minimum of 2 years of generator field experience on the product being supplied and shall be factory trained and certified.
6. Shall have qualified field service technicians with a current EL-07 Maintenance Electrician License as required by the Washington State Department of Labor and Industries.

7. Shall have a warehouse of with sufficient parts located within 150 miles of the job site.

Only a factory direct or a first tier distributor shall be acceptable. Second tier dealers are not approved.

Only approved local distributors shall supply equipment provided under this contract. Equipment by non-local distributors shall not be accepted.

The distributor shall be the authorized engine distributor for the prime mover.

B. PRODUCT SELECTION FOR RESTRICTED SPACE

The site and building are designed around the approved generator sets. This includes sizing of fuel tanks, proper airflow, NEC clearance requirements, and access space. The Contractor, in concurrence with the Engineer, shall make all changes necessary required to meet the design requirements when submitting on an alternate generator at no additional cost to the Owner.

Generator set to be UL 2200 listed "Stationary Engine Generator Assemblies."

C. EMISSIONS

EPA certified for all current EPA emissions requirements.

D. FACTORY TEST

Test assembled generator set at the factory prior to shipment to the job site. The power factor for the factory test shall be at 0.8 p.f.

Show the following conditions at load and no load on the Generator Set: Charging System Volts, Voltage Output, Frequency, Coolant Temperature, and Oil Pressure, and other pertinent information on the test report. Provide a plot of the transient voltage and a plot of the frequency response versus time as a result of a full load single step.

Perform manufacturer's standard factory tests.

Test for a minimum of 30 minutes at full load per NFPA 110.

1.8 PROJECT/SITE CONDITIONS

A. ENVIRONMENTAL REQUIREMENTS

Engine generator system is designed, engineered, and rated to withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: Minus 5 degrees F to 122 degrees F.
2. Relative Humidity: 0 to 95 percent.
3. Elevation: Sea level to 500 feet.

B. SEISMIC REQUIREMENTS

The entire generator package including all mounted accessories shall comply with the requirements of the 2015 IBC and ASCE 7-05 Minimum Design Loads for Building and Other Structures, Chapter 13 "Seismic Design for Nonstructural Components," as referenced and amended by the IBC. Seismic design parameters are as follows:

- Risk Category IV
- Site Class D
- The component Importance Factor: $I_p = 15$
- Design response acceleration coefficients:

$$S_{DS} = 0.841g$$

$$S_{D1} = 0.493g$$

- Seismic Design Category D

1.9 WARRANTY AND MAINTENANCE

A. WARRANTY

The manufacturer shall warrant the materials and workmanship of the generator set for a minimum of 5 years, or 2,500 hours from the registered commissioning and startup.

The warranty shall be comprehensive and shall include all components included in the generator package. No deductibles

shall be allowed for travel time, service hours, repair part costs, etc., during the warranty period.

B. 2-YEAR MAINTENANCE SERVICE

Beginning at time of Substantial Completion, provide 24 months full maintenance service performed by qualified service technicians of the manufacturer's designated service organization. Include twice yearly inspections to check for defects and operational abnormalities. Include routine preventive maintenance (oil changes, filter changes, belt adjustments, etc.) as recommended by the manufacturer and perform adjustments as required to bring the generator performance back into compliance with the original specifications. Provide OEM parts and supplies to complete all service to support all factory warranty requirements with written reports to the Owner upon completion of visits. No deductibles shall be allowed for travel time, service hours, repair part costs, etc., during the warranty period.

Provide a 2-hour load bank test on the generator at 11 months and 23 months from the time of Substantial Completion.

1.10 EXTRA MATERIALS

Reference Specification Section 16050 for spare parts.

PART 2 PRODUCTS

2.1 MANUFACTURERS

The generator assembly shall be Cummins Power Generation as provided by Cummins Northwest. No other manufacturers shall be accepted.

2.2 ENGINE

A. FEATURES

1. Four-stroke cycle diesel engine of either vertical in-line or V-type suitable for operation on No. 2 diesel fuel.
2. Engine speed shall be governed by an electronic governor. Refer to frequency requirements specified earlier in this Specification.

B. COMPONENTS

1. Oil Pump

Gear type lubricating oil pump for supplying oil under pressure to main bearings, crankpin bearings, pistons, piston pins, timing gears, camshaft bearings, and valve rocker mechanism.

2. Oil Filters

Full flow oil filters conveniently located for servicing, with a spring-loaded bypass valve to ensure oil circulation.

3. Air Filter

Dry type air filter.

4. Cooling System

Sufficient to cool the engine when the generator set is delivering full rated load in an ambient temperature of 104 degrees F.

a. Engine-driven, centrifugal-type water circulating pump.

b. Thermostatic valve.

5. Batteries

Lead acid batteries shall be of sufficient capacity to permit starting the generator engine a minimum of four times without recharging. Batteries are to be mounted in an earthquake- and drip-proof rack on the skid, frame, or other approved separate location with required connections provided.

6. Battery Charger

a. Silicone rectifier static type, self regulated with high current and full float operation with a filtered output.

b. The charger shall be capable of providing a 10 A DC high current charging rate when the battery voltage is

below the “float voltage set point.” Full floating charging when voltage is above the set point.

- c. Battery charger operates from 120 volts, single phase AC connected to Generator Auxiliary Device Panel (GADP) as per Section 2.6.A.
- d. The charger shall be complete with voltmeter, ammeter, charging rheostat, automatic equalizing timer, and high/low battery voltage alarm.
- e. The battery charger shall be factory mounted with vibration isolators to prolong service life.
- f. Battery charger shall include standard NFPA outputs where generator is legally required for life safety.
- g. Provide watertight flex connections for all conduits and piping attached to generator.

2.3 ALTERNATOR

The generator shall be provided with an alternator. The alternator shall be four pole, 1,800 rpm revolving field type. The alternator enclosure shall be of drip-proof construction and the insulation shall be Class H. Wiring shall be 12-lead, reconnectable, and configured for the specified voltage, phasing, neutral point, and frequency.

2.4 VOLTAGE REGULATOR

An electronic voltage regulator shall be provided.

2.5 CONTROL PANEL

The Control panel shall be remote, from the generator, mountable. The generator control panel and the generator main circuit breaker shall be installed per NEC clearances and provide accessibility to equipment. The tops of control panel and the circuit breakers shall be mounted a maximum of 72 inches above the finished floor.

- A. The control panel shall operate at 12 or 24 VDC from the generator/battery electrical system as required by manufacturer based on the size of the system.

B. Control panel shall include the following functions/devices:

1. Automatic Starting System

Provides three 15 second cranking cycles and two rest periods followed by a lockout and alarm. Operation is initiated by the closing of a remote Form A contact in the automatic transfer switch control circuit.

2. Indicating light for alarm condition

3. Indication for the following:

- a. Running
- b. Low coolant level
- c. High coolant temperature
- d. Low oil pressure
- e. Over speed
- f. Over crank
- g. AC volts for each phase
- h. AC current for each phase
- i. Frequency
- j. Lube oil pressure
- k. Coolant temperature
- l. Run Time
- m. Number of Starts

4. Engine "AUTO-OFF-MANUAL" control selector switch.

5. Red colored emergency shutdown

Push button/switch.

6. Time delay relay

The time delay relay shall permit operation at “NO-LOAD” after retransfer of load to normal source (cool down timer).

7. Automatic Safety Controls

The following alarms shall turn the engine off:

- a. Low lubricating oil pressure
- b. Low coolant level
- c. High jacket water temperature
- d. Engine over speed

C. DRY CONTACTS

Include a Form A (N.O. Dry) contact for remote connection for each of the following Generator functions.

1. Running
2. General Alarm
3. Fail (shall include, as a minimum, any combination of conditions in 8 above)
4. AUTO-OFF-MANUAL control switch in Auto Mode
5. Low Battery Voltage
6. Low Oil Pressure
7. High Coolant Temperature
8. Low Fuel Level
9. High Fuel Level
10. Fuel Tank Leak
11. E-Stop Depressed

D. CONTROL CABINET HEATER

As described in Part 2.6-B of this Section.

2.6 ACCESSORIES

A. GENERATOR AUXILIARY DEVICE PANEL

The generator manufacturer shall provide, install, and prewire a Generator Auxiliary Device Panel (GADP) as part of the generator system with the following minimum features:

1. The GADP shall consist of a NEMA 1 gasketed 240/120 VAC single phase load center with a main breaker and appropriately sized branch circuit breakers for the battery charger and the heaters listed below under GENERATOR HEATERS. Available power to the panel may be 240/120 VAC or 208/120 VAC, single phase.

Exception:

The GADP load center can be replaced with one or more 20 A, 4-plex receptacle sets in cast aluminum boxes under the following conditions:

- a. *The battery charger and all heater loads are 120 VAC, single phase,*
 - b. *All loads are prewired by the manufacturer with grounded plug cables,*
 - c. *The receptacles are placed within reach of all load plugs,*
 - d. *If required, multiple 4-plex receptacle sets are connected together by the manufacturer (provide a single electrical connection point for the Contractor).*
2. For indoor generators, the GADP shall be securely mounted on the generator skid in a location easily accessible by the operator and to a Contractor-provided power conduit.
 3. The GADP shall be internally connected to the described loads by the generator manufacturer.

4. It is the intent that the Contractor need only provide a single power conduit and associated conductors to the manufacturer-provided GADP and terminate the conductors to a main circuit breaker, neutral, and ground. All connections for heater controls and devices shall be prewired and pretested by the manufacturer.

B. GENERATOR HEATERS

1. Coolant Heater

Engine mounted, thermostatically controlled immersion type engine coolant heater to ensure a minimum coolant temperature of 120 degrees F at ambient room temperature of 5 degrees F. Provide as shown in the table below.

Provide the following generator set heaters:

Device	Voltage Configuration	Wattage (W)
Coolant Heater	120	1,500

C. CIRCUIT BREAKERS

Provide an output main circuit breaker according to the plans and specifications section 16410. This breaker shall be lockable in its open position. The breaker shall have an auxiliary contact that is open when the breaker is in the open position. This circuit shall be prewired by the generator manufacturer to dedicated terminals in the generator control panel. Wire between these devices in LFMC conduit.

Provide a generator field protection circuit breaker, or other means to protect the alternator.

Provide a load bank circuit breaker according to the plans and that meets specification section 16410.

D. DECALS, PLACARDS, AND SIGNS

The generator manufacturer shall provide all decals and signage as required by the regulatory and/or inspecting agency for the particular installation, including, but not limited to the following:

1. One hazardous material placard, diamond shape, 4 color (red, white, blue, yellow) with numbers 020 (diesel, kerosene, fuel oil) in accordance with NFPA 704.
2. A permanent sign at the fill point for the fuel tank. The sign shall include the filling procedure and tank calibration chart. The filling procedure shall require the person filling the tank to determine the gallons required to fill it to 90 percent of capacity before commencing the fill operation.
3. The Contractor shall provide the following in an easily viewable location on the fuel tank unless noted otherwise:
 - a. One 3" x 12" decal labeled "Diesel" (black/white).
 - b. At each entrance to the room, one 8" x 33" decal labeled "Danger Combustible Liquid" with white letters no less than 3 inches in height and 1/2 inch in stroke on a red background.
 - c. At each entrance to the room one 3" x 12" decal labeled "No Smoking" (red/white).

E. VIBRATION ISOLATORS

Provide vibration isolators between the unit and the sub-base fuel tank. The isolation mountings shall consist of malleable cast iron top and bottom housings incorporating steel spring or elastomeric construction and shall be provided with built-in leveling bolts, elastomeric pad and built-in resilient chocks to control oscillation and withstand lateral forces in all directions. Isolators shall be presized and installed in accordance with the recommendations of the generator set manufacturer.

Vibration isolation efficiency shall be 96 percent at 1,800 rpm. Provide Korfund or equal.

Calculations shall be provided with the vibration isolation submittal demonstrating that the specified efficiency can be met with the project specific system characteristics.

Vibration isolators may be waived with manufacturer's documentation that the entire generator package including mounted accessories is IBC certified without them.

F. SPRING ISOLATORS

Provide spring isolators for all generators 500 kW and larger.

G. ANCHORS

Anchors used to secure the generator to the base or other stable surface shall be designed and sized by the manufacturer. The Contractor shall provide and install these anchors.

2.7 SUBBASE TANK

A. Provide dual wall UL 142 listed sub base tank sized to meet 20 hours runtime at full load or 225 gallons whichever has a larger volume. The external tank profile shall be "flat" within ± 0.25 inches of vertical offset per 100 inches of horizontal length (± 0.14 degrees maximum).

B. The sub base tank shall have custom dimensions to reduce the height and accommodate the filling and venting components as shown on the Plans.

C. REMOTE FUEL FILLING SYSTEM

Contractor shall supply a remote fuel filling station as listed in Part 2.8.

D. LEVEL SWITCH

Provide a liquid level float switches, Pneumercator LS600 or equal, assembly capable of the following:

1. High level alarm set at 90 percent tank capacity
2. Low level alarm set at 30 percent tank capacity

E. LEAK DETECTION SWITCH

Provide secondary containment leak detection. Provide Pneumercator LS600LD or equal.

F. OVERFILL PREVENTION VALVE

Provide an overfill prevention mechanical valve set to shut off fuel flow when the tank level reaches 95 percent tank capacity. The overfill prevention valve shall be sized and coordinated with the fuel tank manufacturer to fit the fill port and shall be coordinated with the remote fuel filling system described in Part 2.8. Provide Guillotine Inc., or equal.

G. DROP TUBE

Provide aluminum drop tube at the fuel fill, fuel return, and fuel supply ports. The drop tube with diffuser or suction strainer shall terminate a minimum of 6 inches from the bottom of the tank and shall be installed in a manner, which avoids excessive vibration.

H. FUEL FILL CONNECTION

Provide two 2-inch connections as shown on the Plans. Materials of construction shall be A36 carbon steel or aluminum meeting ASTM B221.

I. NORMAL VENT

Provide a 2-inch-diameter upward vent for normal atmospheric venting. The normal vent shall terminate outside, 12 feet above adjacent ground level. Vent piping shall be Schedule 40 Type S, Grade A steel pipe conforming to ASTM A53. The contractor shall provide all supports for the vent.

J. PRESSURE VACUUM VENT

A pressure/vacuum vent shall be installed at the top of the normal vent pipe, set at 1 oz per square inch. The body construction shall be Aluminum with stainless steel seat and poppet and the vacuum gasket shall be constructed of fuel resistant material. The pressure/vacuum vent shall be in accordance with NFPA 30. Provide Morrison Bros. Fig. 748 or equal.

K. EMERGENCY VENTS

Supply emergency vents for pressure relief only, Manufacturer shall size to prevent a pressure greater than 2.5 psi for the secondary containment tank and primary tank. The emergency vents shall terminate outside. Construction shall be aluminum with painted cast iron cover and Viton O-ring seat material; galvanized materials shall not be used. Mounting connection shall be male NPT. Vents shall be UL listed and in accordance with NFPA 30. Provide Morrison Bros. Fig. 244 or equal.

L. CLOCK STYLE LEVEL GAUGE

Provide clock gauge calibrated for feet and inches. The gauge shall be constructed vapor tight and swivel 360 degrees. The float shall be installed within a drop tube.

1. Construction Material: Aluminum
2. Connection: 2-inch NPT
3. Float: Stainless steel
4. Cable: Stainless steel
5. Manufacturer and Model: Morrison Bros., Fig 818

2.8 REMOTE FUEL FILL SYSTEM

The remote fuel filling system shall consist of a fuel fill panel as well as a fuel alarm panel. Both components shall be provided by the same manufacturer. The system shall allow for remote filling of the generator sub-base fuel tank and shall provide alarms that will protect against system overflow.

A. REMOTE FUEL FILL PANEL

The remote fuel fill panel shall consist of a lockable, wall mounted enclosure. The enclosure shall be equipped with mounting tabs, a pad-lock door latch, vent holes, and grounding stud. The enclosure shall be steel conforming to ASTM A36 and shall receive a powder-coat finish in the manufacturer's standard color. The enclosure shall also include a minimum of 5 gallons of excess volume for spill containment.

The interior of the enclosure shall contain fuel supply piping with a quick-disconnect pipe adapter with dust cap, check valve, sump hand pump, and manually controlled isolation valve. Inlet and outlet piping connections shall be 3-inch diameter. Fuel fill connection shall be located a minimum 5 feet away from all building openings. All components shall be provided by the same manufacturer.

Provide Simplex FuelPort fill system, or equal.

B. REMOTE FUEL ALARM PANEL

The remote fuel alarm panel shall include a NEMA 3R, lockable enclosure suitable for exterior installation. The panel shall provide for audio and visual problem indication and shall be suitable for the application including Class II liquids. The system shall include indicating lights (as described below) an audible alarm horn (90 dB) that will notify of an alarm condition.

The panel will connect to two separate level sensors as described in Part 2.7 of Section 16230 of these Specifications. These sensors are located within the proposed generator sub-base fuel tank and will notify the Owner if a high tank level, low tank level, or secondary containment tank alarm conditions exist.

The panel shall include the following components:

- High tank level alarm light (RED)
- Low tank level alarm light (RED)
- Secondary tank leak alarm light (RED)
- Push to test button (BLACK)
- Push to reset button (BLACK)
- Push to silence button (BLACK)

The panel shall be compatible with single phase, 115VAC or 24 VDC, 60Hz power supply and shall be listed by the Underwriters Laboratory.

Provide Simplex TC-8 Alarm system, or equal.

2.9 GENERATOR RECEPTACLES

- A. For 3-phase systems with neutrals such as 480/277 V, 240/120 V, or 208/120 V systems, generator receptacles shall be NEMA 3R, 400 A, 600 V, reverse service, and 4-pin with style 1 (shell) grounding unless stated otherwise in the Plans.

- B. Contractor shall provide NEMA 3R mounting boxes for all new generator receptacles. Size mounting boxes such that the conductors maintain or exceed their minimum bending radius as required by the NEC.
- C. Generator receptacles shall be provided with lockable end caps.

2.10 FINISH

The entire standby generator set assembly with accessories is to be factory painted, color chosen by Owner from manufacturer's standard colors. Generator set manufacturer shall provide appropriate epoxy/polyurethane coating system for high heat conditions.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

Deliver engine generator set and system components to their final locations in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is safe from such hazards. Field repair of material or equipment made defective by improper storage or site construction damage by other trades may be cause for rejection of installation.

3.2 INSTALLATION

- A. Install the complete generator set and accessories per the manufacturer's installation instructions.
 - 1. Anchor the generator set to concrete housekeeping base or pad with high strength anchors and adequate penetration suitable for the Seismic Design Category as specified in the Plans.
 - 2. Make all electrical connections between accessory items, which are not factory wired, prior to requesting the test engineer.
- B. Maintain minimum workspace around unit and components per manufacturer's installation shop plans and NFPA 70 NEC.
- C. Provide a complete fill of lubricating oil.

- D. Provide a complete fill of fuel in diesel storage tank before testing.
- E. Provide a complete fill of manufacturer approved antifreeze (ethylene-glycol) and water to protect the engine and heat exchanger cooling system to minus 25 degrees F.
- F. Contractor shall locate generator control panel and the generator main circuit breaker per NEC clearances and provide accessibility to equipment. Neither shall be mounted more than 72 inches above the floor. Include all costs associated with relocating the standard control/service panel arrangement on generator set to maintain code requirements in the Bid Cost.
- G. The generator set shall not be started up or tested in the field until all exhaust piping has been insulated as specified and shown on the Plans. All intake and exhaust louvers and fuel system components shall be fully functional.

3.3 IDENTIFICATION

Identify field installed wiring, components, and provide warning signs as specified in Section 16050.

3.4 GROUNDING

Provide ground continuity to facility electrical ground system as indicated in the Plans and Specification 16060.

3.5 FIELD QUALITY CONTROL

A. Provide services of a factory authorized service representative to provide inspection results of field visit and field testing in writing.

B. TESTING AGENCY

Provide the services of a qualified independent testing agency to perform specified field quality-control testing.

C. TESTING

1. Prior to Energization

After installing disconnect switches and circuit breakers, perform visual and mechanical inspection of enclosure and devices.

Check connections and mounting for proper torque.

For molded case circuit breakers 100 Amps and larger, provide independent testing agency to perform switch tests as stated in NETA ATS, Section 7.5 and circuit breaker tests as stated in NETA ATS, Section 7.6. Certify compliance with test parameters.

Provide the Engineer separate copies of test results signed by testing agency. Include the manufacturer's circuit breaker curve for each breaker tested.

Correct or replace malfunctioning units and retest.

Remove any burrs, filings, or other foreign materials from enclosure. Completely wipe down and vacuum enclosure.

2. After Energization

After electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

Correct malfunctioning units on site where possible and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

D. FIELD TEST

Test the assembled generator set after installation at the job site is complete.

1. Advise the Engineer at least 2 weeks in advance so that the test may be witnessed if desired.
2. Under supervision of a factory authorized service representative, pretest all system functions, operations, and protective features. Provide all instruments and equipment required for tests. Adjust to ensure operation is according to

specifications. Test the system for 2 hours minimum at full load and 1.0 power factor.

3. Perform manufacturer's standard field tests. Provide a field load bank for testing of the generator set at loads.
4. The Contractor shall demonstrate the backup power system is fully functional by simulating power outages.
5. System Integrity Tests

Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.

6. Record voltages, frequency, amperage, engine temperature, generator temperature, lube oil pressure, etc., during the test.
7. Submit certified field test results to the Engineer.
8. Refill the generator tank after completion of field testing.

E. RETEST

Correct deficiencies identified by field tests and observations, and retest until specified requirements are fully met.

3.6 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 maintenance and operation of all components of the unit. 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
 8. Fuel and monitoring system
 9. Spare parts that have been provided
- B. At least one training session, at least 3 hours in duration, shall be conducted at the site after startup 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 2 weeks prior to the time of the training.

3.7 FINAL ADJUSTMENTS

- A. Adjust voltage and frequency output of generator set to nominal ratings and mark gauges with plastic pen for normal, operation references for Owner.
- B. Adjust time response of control system to meet site performance requirements.
- C. Check all remote connections again for proper tightness.

3.8 CLEANING

Upon completion of installation and startup, inspect engine generator set. Remove paint splatters, other spots, dirt, and debris. Perform touchup painting to cover scratches and marks to finish. Match original finish of generator set.

***** END OF SECTION *****

SECTION 16410

ENCLOSED SWITCHES, FUSES AND CIRCUIT BREAKERS

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section consists of individually mounted switches and circuit breakers used for the following:

- A. Feeder and equipment disconnect switches

1.2 RELATED WORKS SPECIFIED ELSEWHERE

<u>Sections</u>	<u>Item</u>
01300	Submittals
16050	Basic Electrical Materials and Methods
16140	Wiring Devices

1.3 SUBMITTALS

Submit under the provisions of Section 01300.

Manufacturer's Product Data for disconnect switches, circuit breakers, and accessories specified in this Section.

Maintenance data for tripping devices to include in the operation and maintenance manual specified in Section 16050.

1.4 QUALITY ASSURANCE

See Section 16050.

Obtain disconnect switches and circuit breakers from one source and by a single manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. AVAILABLE MANUFACTURERS

Subject to compliance with requirements, manufacturers offering disconnect switches and circuit breakers that may be incorporated into the work include, but are not limited to, the following:

1. General Electric Co.; Electrical Distribution and Control Division.
2. Siemens Energy & Automation, Inc.
3. Square D Co.
4. Eaton, Cutler Hammer.

2.2 DISCONNECT SWITCHES

A. SAFETY DISCONNECT SWITCHES

Safety disconnect switches shall be provided when the motor starter is not in sight of the associated motor or when shown on the Plans. Motor safety disconnect switches shall be provided with the following specifications.

1. Switches shall not be fused unless specifically shown otherwise on the Plans.
2. Switches shall include pad lockable handles, lockable in both the open and closed positions.
3. Switches shall be rated at 600 V.
4. Switches shall be rated at motor horsepower or as per the Plans, whichever is the larger.
5. Switch enclosures shall be NEMA 4X stainless steel unless specifically stated otherwise in the Plans or through the approval of the Engineer.

2.3 ENCLOSED CIRCUIT BREAKERS

A. ENCLOSED, MOLDED-CASE CIRCUIT BREAKER

NEMA AB 1, with lockable handle in both the open and closed positions.

B. CHARACTERISTICS

Frame size, trip rating, number of poles, and auxiliary devices as indicated on the Plans with interrupting rating to meet available fault current.

1. Main and feeder breakers shall be molded case breakers with thermal magnetic trip.
2. Motor circuit breakers shall be magnetic only trip with adjustable trip setting.
3. Branch circuit breakers shall be molded case, thermal-magnetic trip, trip-free with non-interchangeable, non-adjustable trip unless otherwise noted.

C. APPLICATION LISTING

Appropriate for application, including switching fluorescent lighting loads (SWD) or heating, air-conditioning, and refrigerating equipment (HACR).

D. LUGS

Mechanical lugs and power-distribution connectors suitable for copper conductors of the number and size indicated.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install the disconnect switches and circuit breakers level and plumb in locations as indicated, according to manufacturer's written instructions.
- B. Install wiring between disconnect switches, circuit breakers, control, and indication devices.

- C. Connect disconnect switches and circuit breakers and components to wiring system and to ground as indicated and as instructed by manufacturer.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- D. Identify each disconnect switch and circuit breaker according to requirements specified in Section 16050.

3.2 FIELD QUALITY CONTROL

A. TESTING AGENCY

Provide the services of a qualified independent testing agency to perform specified field quality-control testing.

B. TESTING

1. Prior to Energization

After installing disconnect switches and circuit breakers, perform visual and mechanical inspection of enclosure and devices.

Check connections and mounting for proper torque.

Remove any burrs, filings, or other foreign materials from enclosure. Completely wipe down and vacuum enclosure.

3.3 ADJUSTING

Set field-adjustable disconnect switches and circuit-breaker trip ranges as indicated.

Provide fuses for fused disconnect switches to coordinate with manufacturer's listed maximum fuse size for equipment supplied by the disconnect switch.

***** END OF SECTION *****

MEASUREMENT AND PAYMENT



TABLE OF CONTENTS

SECTION 4

MEASUREMENT AND PAYMENT

BID ITEM INTRODUCTION	1
MOBILIZATION	1
TEMPORARY EROSION AND SEDIMENTATION CONTROL.....	2
TRENCH SAFETY SYSTEM	2
GENERATOR DEMOLITION	2
CONCRETE REMOVAL AND NEW GENERATOR PAD	3
DECOMMISSION EXISTING 300-GALLON DIESEL FUEL TANK.....	3
TREE REMOVAL.....	3
CHAIN LINK FENCING AND GATES	3
WHEEL STOP	3
CRUSHED ROCK.....	4
ASPHALT RESTORATION.....	5
RESERVOIR GUARDRAIL WATER-PROOFING	5
RESERVOIR ROOF VENT AND HATCHES.....	5
GENERATOR W/SUBBASE FUEL TANK AND ACCESSORIES	6
BOOSTER STATION BUILDING IMPROVEMENTS	6
BOOSTER STATION BUILDING ELECTRICAL.....	6
SITE ELECTRICAL	6
QUALITY CONTROLS CORPORATION.....	6
SITE RESTORATION	7



Section 4 - Measurement and Payment

Bid Item Introduction

It is the intent of these Specifications that the performance of all work under the bid items shall result in the complete construction, in proper operating condition, of the facilities described. It is understood that any additional material or work required to place the facilities in operating condition shall be provided by the Contractor as work covered by the listed bid items and shall be considered incidental thereto.

Submittals, shop drawings, calculations, start-up, testing, training, warranties, and operation and maintenance manuals as required shall be considered incidental to the various items of work and no additional compensation will be allowed.

Mobilization

The lump sum price bid for mobilization shall be full compensation for all labor, equipment, tools and materials required for preparatory work and operations, including, but not limited to the following items:

1. The movement of personnel, equipment, supplies and incidentals to the project site as related to project mobilization, demobilization and cleanup.
2. The establishment of field offices and material storage areas.
3. Purchase, delivery and storage of pipe, fittings, appurtenances, and all other materials required for the project.
4. Insurance, bonding, submittals and other work and operations that must be performed or costs incurred before beginning contract work.
5. Mobilization costs for subcontracted work.

Payment for mobilization will be made monthly based upon the following partitions:

1. 10% of the original Contract amount, but not more than 100% of the amount bid for mobilization, will be paid as part of the first monthly pay estimate.
2. When 75% of the original contract amount is earned, 100% of the amount bid for mobilization will be paid.



Temporary Erosion and Sedimentation Control

The lump sum price bid for Temporary Erosion and Sedimentation Control shall be full compensation for all labor, materials, tools and equipment necessary and incidental to install, maintain and remove the TESC facilities. This item shall include, but not be limited to, the following: filter fabric fence, filter bags, storm drain inlet protection, straw bales, plastic sheeting, construction entrance mat, and street sweeping.

Trench Safety System

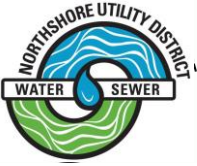
The lump sum price bid for trench excavation protection shall constitute full compensation for all labor, materials, tools and equipment necessary and incidental to providing a safe trench excavation. This item shall include, but not be limited to, the following:

1. Design, installation, proper use and removal of all sheeting, shoring, cribbing, boxes or other trench protection methods.
2. Excavation, backfill, compaction and other work required if extra excavation is used in lieu of trench box, shoring, cribbing or other trench protection. If imported backfill gravel is required for backfilling within the limits of the sewer or water line excavation, it shall also be required as backfill material for the extra excavation and shall be provided at the Contractor's expense.
3. All barricades, warning lights, signs, flaggers or other devices needed to warn and protect the public.

The Contractor shall be solely responsible for the safety of his crew and public, and the District assumes no responsibility. The District will not be responsible for determining the adequacy of any system used by the Contractor and payment for protection systems will not imply District's approval of adequacy.

Generator Demolition

The lump sum price bid for Generator Demolition shall constitute full compensation for all labor, materials, tools and equipment necessary and incidental to remove and wastehaul the existing booster station generator, skid, isolation pads, flex conduit, exhaust system, ductwork, fans, supports and associated electrical per the Drawings. This work shall also include all costs to dispose of diesel fuel and oil.



Concrete Removal and New Generator Pad

The lump sum contract price for Concrete Removal and New Generator Pad shall constitute full compensation for all labor, materials, tools and equipment necessary and incidental to remove and wastehaul the existing concrete, subgrade and reinforcing as shown on the Plans. This work shall also include all costs to install and test the new Generator equipment pad including excavation, installation of subgrade, isolation joints and reinforcing as shown on the plans.

Decommission Existing 300-Gallon Diesel Fuel Tank

The lump sum contract price for Decommission Existing 300 Gallon Diesel Fuel Tank shall constitute full compensation for all labor, material, tools and equipment necessary and incidental to decommission and abandon in place the existing buried 300-gallon diesel fuel tank as shown on the Plans and described in Engineering Specifications Section 13250. This work shall also include all costs to decommission the existing fuel lines, and to restore disturbed areas per the Plans and these specifications.

Tree Removal

The lump sum price bid for Tree Removal shall constitute full compensation for all labor, material, tools and equipment necessary and incidental to remove and wastehaul existing trees and shrubbery as shown on the Plans. This work shall also include all costs to restore areas disturbed during the tree removal process.

Chain Link Fencing and Gates

The unit price bid per linear foot for Chain Link Fencing and Gates shall constitute full compensation for all labor, material, tools and equipment necessary and incidental to replacing the existing perimeter fencing at the locations shown on the drawings and installing a new entry gates. This item includes, but is not limited to, removal and disposal of the existing fence and posts, installation of new chain link fencing, fence posts including concrete foundation and top cap, top and bottom rail, slats in locations identified on the drawings, barbed wire, and restoring disturbed areas to original condition after completion of work.

Wheel Stop

The unit price per each for Wheel Stop shall constitute full compensation for all labor, materials, tools and equipment necessary and incidental to the complete installation of each wheel stop, per the Drawings and these Specifications.



Crushed Rock

The unit price bid per ton for Crushed Rock shall constitute full compensation for all labor, material, tools and equipment necessary and incidental to furnishing the materials under asphalt trench, pipe backfill, foundation gravel for the electrical vault and generator pad, in the shoulder, or elsewhere as required or as directed by the District, and proper disposal of excavated materials. These items shall include, but not be limited to, the following:

1. Over-excavation or extra depth excavation as may be required by the District, or field conditions, which dictate such excavation, as approved by the District.
2. Grading, preparation and compaction of existing subgrade.
3. Proper disposal of excavated materials.

Payment for gravel and rock materials will be made based on the actual number of tons of material furnished and placed. Quantities shall be based on certified weight tickets signed by the driver and collected by the inspector at the time and place of delivery. Loads of material for which a certified weight ticket has not been given to the inspector shall not be paid for.

Gravel and rock materials will be paid for by the ton as substantiated by certified scale tickets, up to the maximum quantity calculated for the volume within the neat lines of the trench as specified in the specifications and standard details. A conversion factor of 1.85 Tons/CY will be used to convert cubic yards of material to tons.

It will be the Contractor's responsibility to see that a ticket is given to the Inspector for each truckload of material delivered. Duplicate tally tickets shall be prepared to accompany each truckload of material delivered on the project. The tickets shall bear at least the following information:

1. Truck number.
2. Quantity delivered in cubic yards and tons.
3. Driver's name and date.
4. Location of delivery - by job name and stationing on each job.
5. Place for receipting by the inspector.



Asphalt Restoration

The unit price bid per ton for Asphalt Restoration shall constitute full compensation for all labor, materials, tools and equipment necessary and incidental to furnishing and placing 4-inch asphalt pavement in paved areas or as shown on the construction plans. Asphalt restoration shall include, but not be limited to, the following:

1. Preparation of subgrade and sawcutting existing pavement edges.
2. Furnishing, placing and compacting asphalt, per the asphalt specifications of the permitting agency, including sealing. Asphalt shall be compacted in 2-inch lifts.
3. Adjusting all gratings, catch basins, vault lids, and any other improvements to final grade of the completed pavement.
4. Contractor to provide truck tickets to District

Payment will be made based on the actual number of tons of HMA furnished and placed at the location shown on the Drawings. Any other asphalt damaged by the Contractor's operations will be the Contractor's responsibility and shall be restored by the Contractor to the satisfaction of the property owner of appropriate governing jurisdiction with no compensation provided by the District.

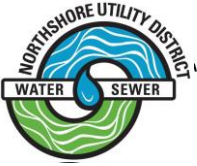
Crushed rock for the asphalt base will be measured and paid for under the bid item for crushed rock.

Reservoir Guardrail Water-Proofing

The lump sum price bid for Reservoir Guardrail Water-proofing shall include all costs for labor, materials, tools and equipment necessary to install new EPDM membrane, elastoform flashing, and flashing on the reservoir guardrail as shown on the Drawings. The lump sum price bid shall also include all costs for labor, materials, tools, and equipment required to remove and wastehaul existing loose coating and membraned prior to installation of new water proofing membrane.

Reservoir Roof Vent and Hatches

The lump sum price bid for Reservoir Roof Vent and Hatches shall include all costs for labor, materials, tools and equipment necessary to replace the two existing reservoir roof hatches, and modify an existing roof hatch to convert it to a vent as shown on the Plans.



Generator w/Subbase Fuel Tank and Accessories

The lump sum bid price for Generator w/Subbase Fuel Tank and Accessories shall include all costs for labor, materials, and equipment to furnish and install the components listed within this project including generator, subbase fuel tank, remote fuel fill station and alarm panel, fill lines and any and all appurtenances necessary to provide a complete and workable electrical power generation system.

Booster Station Building Improvements

The lump sum bid price for Booster Station Building Improvements shall include all costs for labor, materials, and equipment required to furnish and install new glazing, core drilling for all new penetrations for the generator and remote fuel station, building modifications for the new generator exhaust system, prep, prime, and paint the exterior of the booster station as noted on the Drawings. The lump sum bid price shall also include all costs for labor and materials required to apply touch up paint in the booster station interior as noted on the Drawings.

Booster Station Building Electrical

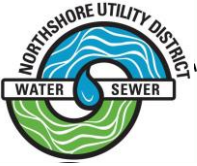
The lump sum bid price for Booster Station Building Electrical shall include all costs for labor, materials and equipment necessary to furnish, install and connect all electrical equipment for the booster station building including installation of components listed within this project including manual transfer switch, automatic transfer switch, portable generator receptacle new variable frequency drives, new solid state motor starter, and all appurtenance necessary to provide a complete and workable system.

Site Electrical

The lump sum contract price for Site Electrical shall include all costs for labor, materials, and equipment required to furnish, install modifications to the existing utility service conduit routing, installation of new utility service meter base, installing electrical hand holes, access hatches, and drains including excavation, bedding, backfill, and connections of drain lines to the existing storm system.

Quality Controls Corporation

The lump sum contract price for Quality Controls Corporation (QCC) shall include all labor, materials, and equipment provided by the District's integrator, QCC, to furnish the main control panel, variable frequency drives, automatic transfer switch, manual transfer switch, portable generator receptacle, and instrumentation as detailed in Appendix B, and provide PLC, VFD and HMI programming and factory testing for the project. Installation of wiring and equipment shall be paid under other bid items. Only direct costs for QCC are included in this lump sum bid price. All

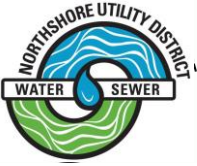


indirect costs, including overhead, mark-up, and subcontractor contract management will be paid incidental to other bid items.

Site Restoration

The lump sum contract price for Site Restoration shall include all labor, materials, and equipment required to perform surface restoration of any areas disturbed or damaged during construction including all private property, staging areas, and all non-pavement portions of the public right-of-way.

PROPOSAL



SECTION 5

Proposal

Honorable Commissioners
Northshore Utility District
King County, Washington

Dear Members of the Board:

The undersigned has examined the site, specifications, plans, laws and ordinances covering the improvements contemplated. In accordance with the terms, provisions and requirements of the foregoing, the following lump sums and unit prices are tendered as an offer to perform the work and furnish the equipment, materials, appurtenances and guarantees, where required, complete in place, in good working order.

As evidence of good faith, cash, bid bond, cashier's check, certified check, or postal money order made payable to the King County Treasurer is attached hereto. The undersigned understands and here agrees that, should this offer be accepted and the undersigned fail or refuse to enter into a contract and furnish the required construction performance bond and necessary liability insurance, the undersigned will forfeit to the District an amount from the "good faith token", equal to five percent (5%) of the amount bid as liquidated damages, all as provided for in the specifications.

The undersigned hereby proposes to undertake and complete the work embraced in this improvement, in accordance with the terms of the specifications and contract documents, at the following lump sum and unit prices.

Please find attached the itemized listing for said lump sum and unit prices, receipt of addenda, non-collusion declaration, the bidder responsibility checklist, the subcontractor responsibility checklist, the statement of bidder's qualifications, and the proposed subcontractors list for Contract 2020-01; Lake Forest Park Reservoir and Booster Station Upgrades.



ATTACHMENTS

2020-01; LAKE FOREST PARK RESERVOIR AND BOOSTER STATION UPGRADES

Item	Item Description – Schedule A	Units	Quantity	Unit Price	Amount
1.	Mobilization	1	LS	\$ Lump Sum	\$
2.	Temporary Erosion and Sedimentation Control	1	LS	\$ Lump Sum	\$
3.	Trench Safety Systems	1	LS	\$ Lump Sum	\$
4.	Generator Demolition	1	LS	\$ Lump Sum	\$
5.	Concrete Removal and New Generator Pad	1	LS	\$ Lump Sum	\$
6.	Decommission Existing 300-Gallon Diesel Fuel Tank	1	LS	\$ Lump Sum	
7.	Tree Removal	1	LS	\$ Lump Sum	\$
8.	Chain Link Fencing and Gates	800	LF	\$	\$
9.	Wheel Stop	2	EA	\$	\$
10.	Crushed Rock	10	TN	\$	\$
11.	Asphalt Restoration	5	TN	\$	\$
12.	Reservoir Guardrail Water-Proofing	1	LS	\$ Lump Sum	\$
13.	Reservoir Roof Vent and Hatches	1	LS	\$ Lump Sum	\$
14.	Generator w/Subbase Fuel Tank and Accessories	1	LS	\$ Lump Sum	\$
15.	Booster Station Building Improvements	1	LS	\$ Lump Sum	\$
16.	Booster Station Building Electrical	1	LS	\$ Lump Sum	\$
17.	Site Electrical	1	LS	\$ Lump Sum	\$
18.	QCC, Inc.	1	LS	\$ Lump Sum	\$79,300.00
19.	Site Restoration	1	LS	\$ Lump Sum	\$
Subtotal					\$
10.0% Sales Tax					\$
Total Bid					\$

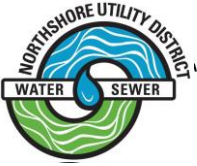


2020-01; LAKE FOREST PARK RESERVOIR AND BOOSTER STATION UPGRADES

Receipt of Addenda

Receipt of Addenda No(s). _____ to the Contract Documents is hereby acknowledged:

Note: Failure to acknowledge receipt of the addenda will be considered an irregularity in the proposal.



NON-COLLUSION DECLARATION

I, by signing the proposal, hereby declare, under penalty of perjury under the laws of the United States that the following statements are true and correct:

1. That the undersigned person(s), firm, association or corporation has (have) not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the project for which this proposal is submitted.
2. That by signing the signature page of this proposal, I am deemed to have signed and to have agreed to the provisions of this declaration.

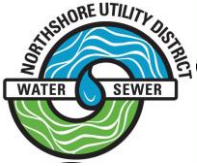
Failure to return this Declaration as part of the bid proposal package will make the bid nonresponsive and ineligible for award.



BIDDER RESPONSIBILITY CHECKLIST

The following checklist is used in documenting that a bidder meets the mandatory Bidder Responsibility Criteria. Please print a copy of documentation from the appropriate website to be included with the submittal.

General Information	
Project Name: Contract 2020-01; Lake Forest Park Reservoir and Booster Station Upgrades.	Project Number: C1502
Bidder's Business Name:	Bid Submittal Deadline:
Contractor Registration	
License Number:	Status: Active: Yes <input type="checkbox"/> No <input type="checkbox"/>
Effective Date (must be effective on or before Bid Submittal Deadline):	Expiration Date:
Contractor and Plumber Infraction List	
Is Bidder on Infraction List?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Current UBI Number	
UBI Number:	Account Closed: Open <input type="checkbox"/> Closed <input type="checkbox"/>
Industrial Insurance Coverage	
Account Number:	Account Current: Yes <input type="checkbox"/> No <input type="checkbox"/>
Employment Security Department Number	
Employment Security Department Number:	
Please provide a copy of your latest correspondence, containing your account number, with Employment Security Department. Please do not provide document containing personal information such as social security numbers.	
State Excise Tax Registration Number	
Tax Registration Number:	Account Closed: Open <input type="checkbox"/> Closed <input type="checkbox"/>
Not Disqualified from Bidding	
Is the Bidder listed on the "Contractors Not Allowed to Bid" list of the Department of Labor and Industries? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Contractor Public Works Training (RCW 39.04.350 & RCW 39.06.020)	
Has the Bidder satisfied the PW training requirements? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Information Supplied by:	
Print Name of Bidder Representative:	Date:
Verified by:	
Signature of District Employee:	Date:



SUBCONTRACTOR RESPONSIBILITY CHECKLIST

The following checklist is used in documenting that a subcontractor of any tier meets the subcontractor responsibility Criteria. Bidder must complete one of these forms for each of the first-tier subcontractor. Please print a copy of the documentation from the appropriate website to be included with the submittal.

General Information	
Project Name: Contract 2020-01; Lake Forest Park Reservoir and Booster Station Upgrades.	Project Number: C1502
Subcontractor's Business Name:	Subcontract Execution Date:
Contractor Registration	
License Number:	Status: Active: Yes <input type="checkbox"/> No <input type="checkbox"/>
Effective Date (must be effective on or before Subcontract Bid Submittal Deadline):	Expiration Date:
Contractor and Plumber Infraction List	
Is Subcontractor on Infraction List?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Current UBI Number	
UBI Number:	Account Closed: Open <input type="checkbox"/> Closed <input type="checkbox"/>
Industrial Insurance Coverage	
Account Number:	Account Current: Yes <input type="checkbox"/> No <input type="checkbox"/>
Employment Security Department Number	
Employment Security Department Number:	
<ul style="list-style-type: none"> • Has Subcontractor provided account number on the Bid Form? Yes <input type="checkbox"/> No <input type="checkbox"/> • And/or have you asked the Subcontractor for documentation from Employment Security Department on account number? Yes <input type="checkbox"/> No <input type="checkbox"/> 	
State Excise Tax Registration Number	
Tax Registration Number:	Account Closed: Open <input type="checkbox"/> Closed <input type="checkbox"/>
Not Disqualified from Bidding	
Is the Subcontractor listed on the "Contractors Not Allowed to Bid" list of the Department of Labor and Industries? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Contractor Licenses	
<u>Electrical:</u> If required by Chapter 19.28 RCW, does the Subcontractor have an Electrical Contractor's License? Yes <input type="checkbox"/> No <input type="checkbox"/>	<u>Elevator:</u> If required by Chapter 70.87 RCW, does the Subcontractor have an Elevator Contractor's License? Yes <input type="checkbox"/> No <input type="checkbox"/>
Contractor Public Works Training (RCW 39.04.350 & RCW 39.06.020)	
Has the Subcontractor satisfied the PW training requirements? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Information Supplied by:	
Print Name of <input type="checkbox"/> Contractor <input type="checkbox"/> Subcontractor Representative:	Date:
Verified by:	
Signature of District Employee:	Date:



STATEMENT OF BIDDER'S QUALIFICATIONS

Contracting Firm Name:
Number of years Contractor has been in the construction business under the present firm name:
Present gross dollar amount of work under contract: \$
Present gross dollar amount of contracts not yet completed: \$
General type of work performed by firm:

List the five major pieces of equipment to be used on this project:	Owned	Leased	Rented
1.			
2.			
3.			
4.			
5.			

List the general superintendents or other supervisory employees at your firm:	# of Years at Firm
Employee 1:	
Employee 2.:	
Employee 3:	

Bank Reference:
Have you changed bonding companies within the last three years?
If so, why? (optional)



PROPOSED SUBCONTRACTORS

Consistent with RCW 39.30.060, each bidder on a project in excess of \$1,000,000 is required to submit the completed Subcontractors list included in the proposal section with the bid. The completed list must identify each subcontractor who will perform heating, ventilation and air-conditioning (HVAC), or plumbing work as described in Chapter 18.106 RCW, electrical work as described in Chapter 19.28 RCW, or the contractor must name itself for the work. The requirement to name the bidder's proposed HVAC, plumbing and electrical subcontractor applies only to those subcontractors who will contract directly with the bidder (i.e. first-tier subcontractors only, even if that first-tier subcontractor intends to hire a sub-tier contractor to perform all or part of the HVAC, plumbing or electrical work

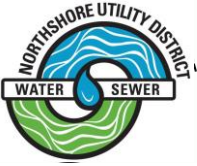
The bidder shall not list more than one subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the bidder must indicate which subcontractor will be used for which alternates.

Failure of the bidder to submit as part of the bid the names of such subcontractors, or name itself to perform such work, or the naming of two or more subcontractors to perform the work, shall render the bidder's bid it nonresponsive and therefore void.

In completing the form, bidders are advised that: 1) Ventilation is typically required to meet safety requirements for enclosed spaces and tunnels or certain shafts, but it may be incidental to other parts of the work, and may be required for the temporary construction facilities; 2) No plumbing work within buildings (as described in Chapter 18.106 RCW) has been specified in the contract, however plumbing work may be required for the temporary construction facilities and elsewhere in the contract documents; 3) Electrical work may be incidental to the work such as encountered with traffic control systems, electrical service to buildings and street lights, distribution wiring, conduit and junction box installation, generators, temporary electrical service and wiring for construction equipment and dewatering systems. In each instance above, the bidder should list the work in the table(s) above. Other areas may be identified by the bidder in the contract documents as well.

The subcontractors list for may be submitted with the Bid, or separately within one hour of the time and date for Bid submittal stated in the Call for Bids or by addendum. The form may be submitted in person or by facsimile (FAX number (206) 283-3206) to:

Gray & Osborne, Inc.
Attention: Eric Delfel, P.E.
1130 Rainier Avenue South, Suite 300
Seattle, WA 98144



HVAC SUBCONTRACTOR	
Firm Name:	% of Project:
Contact Person:	
Address:	
City, State, Zip Code:	
Phone #:	Fax #:
E-mail Address:	

PLUMBING SUBCONTRACTOR	
Firm Name:	% of Project:
Contact Person:	
Address:	
City, State, Zip Code:	
Phone #:	Fax #:
E-mail Address:	

ELECTRICAL SUBCONTRACTOR	
Firm Name:	% of Project:
Contact Person:	
Address:	
City, State, Zip Code:	
Phone #:	Fax #:
E-mail Address:	



Subject to the time lost due to inclement weather and delay in delivery of materials, should such delay not be the result of the undersigned's actions, the undersigned agrees to complete all of the work embraced in this contract in 187 calendar days, all beginning with the date of written Notice to Proceed with the work.

The undersigned fully understands and agrees to the provisions of the Information for Bidders and herewith further agrees that the liquidated damages shall be \$1400.00 per day for each and every working day required beyond the construction time allowed above to complete this project.

Contractor Name:	
Contact Name:	
Mailing Address:	
Office Phone #:	
Cell Phone #:	
E-mail:	

Signature: _____

Print Name: _____

Title: _____

Date Signed: _____

BID BOND FORM

Herewith find deposit in the form of a certified check, cashier's check, cash, or bid bond in amount of \$ _____, which amount is not less than five percent (5%) of the total bid.

SIGN HERE _____

BID BOND for Contract: Contract 2020-01; Lake Forest Park Reservoir and Booster Station Upgrades.

KNOW ALL MEN BY THESE PRESENTS: That we, _____, as Principal, and _____,

as Surety are held and firmly bound unto the King County Treasurer, King County, Washington, as Obligee in the penal sum of _____ for the payment of which the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

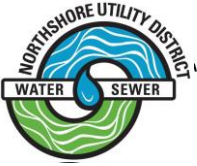
The conditions of the obligation are such that, if the Obligee shall make any award to the Principal for _____, according to the terms of said proposal or bid and award and shall give bond for the faithful performance thereof, with Surety or Sureties approved by the Obligee; or if the Principal shall, in case of failure so to do, pay and forfeit to the Obligee the penal amount of the deposit specified in the Call for Bids, then this obligation shall be null and void; otherwise, it shall be and remain in full force and effect and the surety shall forthwith pay and forfeit to the Obligee, as penalty and liquidated damages, the amount of this bond.

SIGNED, SEALED AND DATED this _____ day of _____, 20____.

By _____
Principal

By _____
Surety

Received return of deposit in the sum of \$ _____,
on _____, 20____.



BIDDER'S CHECKLIST

This checklist is intended to assist the Bidder in completing the Proposal. The Bidder should carefully review the Proposal form and Contract Documents to ensure a responsive bid is submitted.

- Bidders must bid on all items contained in the Proposal. Fill in the bid proposal form(s) included in this section, entering the unit price and total amount for each bid item. Verify all math.
- Only use the bid proposal form(s) included in this document or those issued with an addenda.
- Acknowledge receipt of any addenda.
- Read the *Non-Collusion Declaration* and include the form with the proposal.
- Fill out the *Bidder Responsibility Checklist*.
- Fill out the *Subcontractor Responsibility Checklist*.
- Fill out the *Statement of Bidder's Qualifications*.
- Fill out the *Proposed Subcontractors* list.
- Sign and date the proposal on the final page of the proposal and include all of the contact information as indicated.
- Submit the bid security (in the form of a certified check, cashier's check, cash or bid bond, with amount is not less than 5% of the bid total) with the proposal and fill out the Bid Bond Form.
- Submit the entire Proposal section from the contract documents as your bid documents.

CONTRACT



SECTION 6

Contract

THIS CONTRACT is dated this _____ day of _____, 20____, by and between Northshore Utility District, ("District"), a Washington municipal corporation, and _____ ("Contractor"), a _____.

In consideration of the mutual covenants hereinafter set forth, District and Contractor agree as follows:

ARTICLE 1. DESCRIPTION OF WORK.

The Contractor shall complete the work as specified under the Bid Schedule(s) of Section 5 – Proposal & Bid Bond of the District's Contract Documents entitled Contract 2020-01; Lake Forest Park Reservoir and Booster Station Upgrades. The work is generally described as follows:

Project Description

Contract 2020-01; Lake Forest Park Reservoir and Booster Station

Upgrades

The project consists of the following work:

The project includes improvements to the District's Lake Forest Park Reservoir and Booster Pump Station. The improvements at the Lake Forest Park Reservoir include demolition and replacement of existing site fencing, installation of new double swing access gate, installation of new access man gate, waterproofing guardrail and posts along the parapet wall, installation of new vehicular wheel stops, installation of a new roof access hatch, modification of existing reservoir access hatch into a roof vent hatches, and associated site restoration and paving.

The improvements to the booster pump station include installation of new electrical vault, demolition, removal and waste haul of an existing generator and associated appurtenances, installation of new remote fuel fill station and alarm panel, installation of new generator and associated appurtenances, modifications to existing booster station door thresholds and installation of window glazing, and painting of interior and exterior of the station, including floors. Electrical improvements to the booster pump station include modification of existing utility service conduit routing, installation of new utility



service meter base, installation of new automatic transfer switch, installation of new manual transfer switch and associated electrical, installation of a load bank connection, installation of new power quality panel, installation of new motor starters and installation of new power distribution panel.

ARTICLE 2. WORK COMPLETION TIME.

The work shall be completed within 187 calendar days from the commencement date stated in the "Notice to Proceed" as described in Section 7 – Definitions and Abbreviations.

ARTICLE 3. LIQUIDATED DAMAGES.

District and the Contractor recognize that time is of the essence of this Contract and that the District will suffer financial loss if the work is not completed within the time period specified in Article 2 herein, plus any Extension thereof allowed in accordance with Section 8 – General Conditions. They also recognize the delays, expense, and difficulties involved in proving in a legal proceeding, the actual loss suffered by the District if the work is not completed on time. Accordingly, instead of requiring any such proof, the District and the Contractor agree that as liquidated damages for delay (but not as a penalty), the Contractor shall pay the District \$1400.00 for each day that expires after the work completion time specified in Article 2 herein.

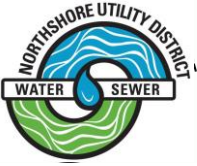
ARTICLE 4. CONTRACT PRICE

District shall pay Contractor for completion of the work in accordance with the Contract Documents in current funds the amount set forth in the Bid Schedule(s) of Section 5 – Proposal & Bid Bond.

ARTICLE 5. CONTRACT DOCUMENTS.

The Contract Documents which comprise the entire agreement between District and Contractor concerning the work consist of this Contract and the following attachments to this Contract:

- Section 1 Instructions to Bidders
- Section 2 Special Provisions
- Section 3 Engineering Specifications
- Section 4 Measurement and Payment
- Section 5 Proposal & Bid Bond



- Section 6 Contract & Performance, Payment and Guaranty Bond
- Section 7 Definitions and Abbreviations
- Section 8 General Conditions
- Plans consisting of 28 sheets, as listed in the Special Provisions.
- Addenda numbers _____ inclusive.
- Change Orders, which may be delivered or issued after the date of this Contract, are not attached hereto.
- Permit and easement stipulations.

There are no Contract Documents other than those listed in this Article.

ARTICLE 6. MISCELLANEOUS.

An assignment by a party hereto of any rights under or interests in the Contract Documents will not be binding on the other party hereto without the written consent of the party sought to be bound; and specifically but without limitation monies that may become due and monies that are due may not be assigned without such consent, and unless specifically stated to the contrary in any written consent to an assignment, an assignment will not release or discharge the assignor from any duty or responsibility under the Contract Documents.

District and Contractor each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.



IN WITNESS WHEREOF, District and Contractor have caused this Contract to be executed the day and year first above written.

DISTRICT

CONTRACTOR

By Alan G. Nelson,
its General Manager

By _____
its: _____

Attest:

Attest:

Address for giving notices:

6830 NE 185th Street,
Kenmore, WA 98028

Address for giving notices:

License No.:



MANAGEMENT OF RETAINED PERCENTAGE

The Contractor shall declare an option for management of statutory retained percentage of this Contract by initialing and dating the applicable box below:

Option 1

The Contractor hereby elects to have the retained percentage of this Contract held in a non-interest bearing fund by Northshore Utility District until sixty (60) days (minimum) following formal Acceptance of the work. The time of release of the retained percentage shall depend upon final receipt by the District of all required releases from the State of Washington.

Option 2

The Contractor hereby elects to have Northshore Utility District place the retained percentage of the Contract in escrow from time to time as such retained percentage accrues. Contractor hereby designates the following bank or trust company as the repository for said funds:

Name of Financial Institution: _____

Address of Financial Institution: _____

Escrow Account Number: _____

The Contractor understands that the District will issue a check or checks representing the retained percentage payable to the financial institutions and the Contractor jointly. This check shall be converted into bonds and securities chosen by the Contractor and approved by the District and the bonds and securities shall be held in escrow. Interest on the bonds and securities shall be paid to the Contractor as the interest accrues. Contractor agrees to be fully responsible for payment of all costs or fees incurred as a result of placing said retained percentage in escrow and investing it as authorized by statute. Northshore Utility District shall not be responsible for any cost, fees or loss in connection therewith.

Option 3

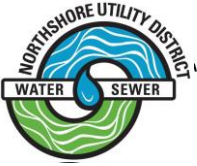
The Contractor hereby elects to have Northshore Utility District place the retained percentage of the Contract in an interest bearing account in a bank, mutual savings bank or savings and loan association. Contractor hereby designates the following bank or trust company as the repository for said funds:

Name of Financial Institution: _____

Address of Financial Institution: _____

Escrow Account Number: _____

Interest on moneys deposited into said fund by the District shall be paid to the Contractor. Contractor agrees to be fully responsible for payment of all costs or fees incurred as a result of placing said retained percentage in said account. Northshore Utility District shall not be responsible for any cost, fees or loss in connection therewith.



Option 4

Contractor hereby elects to post a retainage bond in the amount of 5% of the total bid, not including tax, in lieu of Northshore Utility District withholding the retained percentage from the monies earned by the Contractor. Contractor hereby designates the following surety company as bondholder (a copy of the bond must be attached to this form):

Name of Financial Institution: _____

Contact Name and Phone No.: _____

Address of Financial Institution: _____

Contractor's Signature

Date



PERFORMANCE, PAYMENT & GUARANTY BOND

KNOW ALL MEN BY THESE PRESENTS: That we, _____, the Contractor named in the contract hereinafter referred to as Principal, and _____, as SURETY, are held and firmly bound unto the NORTHSHORE UTILITY DISTRICT, hereinafter called and also being the DISTRICT named in said contract,

Contract 2020-01; Lake Forest Park Reservoir and Booster Station Upgrades. in the full sum of _____ Dollars, (\$_____) lawful money of the United States of America, for the payment of which sum well and truly to be made, we bond ourselves, our heirs, executors, assigns, administrators and successors jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that, **WHEREAS,** the Principal entered into a certain contract with the District, dated _____, 20____ for construction of sanitary sewers and appurtenances including restoration, in connection with the District's construction of **Contract 2020-01; Lake Forest Park Reservoir and Booster Station Upgrades** in the County of King, State of Washington.

NOW, THEREFORE, if the Principal shall well and truly and faithfully perform all of the provisions and fulfill all of the undertakings, covenants, terms, conditions and agreements of said contract during the period of the original contract and any Extension thereof that may be granted by the District, with or without notice to the Surety; and during the life of any guaranty required under the contract; and shall also well and truly perform and fulfill all of the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made; notice of which modifications to the Surety being hereby waived; and furthermore shall pay all laborers, mechanics and subcontractors and material men and all persons who shall supply such person or persons and such Principal or subcontractors with provisions and supplies for the carrying on of such work, shall indemnify and save harmless District from all cost and damage by reason of the Principal's default or failure to do so, and shall pay the State of Washington sales and use taxes, and amounts due said State pursuant to Titles 50 and 51 of the Revised Code of Washington, then this obligation to be void; otherwise to remain in full force and effect.

THIS BOND shall be continued in force for a period of two (2) years after completion of the contract and acceptance by the District, and thereafter for such additional period as shall be required for the performance by the Contractor under this guaranty provision, or otherwise, of the contract.



IN WITNESS WHEREOF, the above bounded parties have executed this instrument under their separate seals this ____ day of _____, 20____, the name and corporate seal of each corporate party hereto affixed, and these presents duly signed by its undersigned representatives pursuant to authority of its governing body.

Principal

Surety

By

By

Title

Title

Attest: (If Corporation)

Address:

By

Title

Corporate Seal:

Witness
1:

Witness
2:



Certificate as to Corporate Seal

I hereby certify that I am the (Assistant) Secretary of the Corporation named as Principal in the within Bond; that

_____, who signed the said Bond on behalf of the Principal, was _____ (title) of said Corporation; that I know its signature thereto is genuine and that said Bond was duly signed, sealed, and attested for and in behalf of said Corporation by authority of its governing body.

Secretary or Assistant Secretary

A copy of this bond shall be filed with the County Auditor.

DEFINITIONS AND ABBREVIATIONS



SECTION 7

Definitions and Abbreviations

DEFINITIONS

The following terms as used in this Contract shall be defined and interpreted as follows:

Acceptance - The District's formal, written notice acknowledging completion and acceptance of the Work. Acceptance commences the time for submission of any third-party claims against performance or payment bonds under Chapter 39.08 RCW and statutory retention under Chapter 60.28 RCW.

Addendum - A written or graphic document issued by the District prior to the Proposal opening date that clarifies, corrects, or changes a document contained or referenced within the Bid Documents.

Adjusted Contract Work - The Contract Work as adjusted by any additive or deductive Change Orders executed prior to the District's termination of the Work or any portion thereof for convenience in accordance with Section 8.31 of the General Conditions.

As-Built Plans - A neatly and legibly marked set of Plans that reflect the manner in which the Work has been performed in the field. The requirements for the As-Built Plans are separately set forth in the Specifications.

Bidder - An entity that submits a Proposal for potential award of the Contract.

Bid Documents - All Contract Documents, excluding Change Orders, but including the Call for Bids.

Change Order - A document which is signed by Contractor and District and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Time, issued on or after the effective date of the Contract.

Claim - A written demand or assertion by the Contractor in accordance with Section 8.23 of the General Conditions after denial of a Request for Change Order seeking, as a matter of right, adjustment of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract.



Contract Documents - The Contract Documents shall consist of the following and, in case of conflicting provisions, the first mentioned shall have precedence:

- Change Orders
- Addenda
- Contract
- Measurement and Payment
- Special Provisions
- General Conditions
- Detail Specifications
- Engineering Specifications – Materials of Construction
- Engineering Specifications – Methods of Construction
- Reference Specifications
- Plans
- Instructions To Bidders
- Bid Proposal
- Permit and easement stipulations
- Performance, Payment, and Guaranty Bond

Contractor - The entity contracting to do the Work under these Contract Documents.

Contractor's Equipment - All equipment remaining in the Contractor's ownership and removed from the Site upon completion of the Project.

Contract - The written form executed by the District and Contractor that binds the Contractor to perform the Work in accordance with the Contract Documents.

Contract Price - The total amount payable by the District to the Contractor for performance of the Work in accordance with the Contract Documents.

Contract Time - The time allotted in the Contract for the Substantial Completion of the Work. The Contract Time begins upon Notice to Proceed and ends on the date of Substantial Completion of the Work by the Contractor.

Day - The term Day shall mean a calendar day unless otherwise specifically designated.

District - The entity that is a party to the Contract, contracting under the official name Northshore Utility District.

Engineer - The person identified in the Invitation to Bid responsible for administration of the Contract for the benefit of the District in accordance with the Contract Documents.



Equipment - The machinery, accessories, appurtenances, and manufactured articles to be furnished and/or installed under the Contract.

Inspector - A representative of the Engineer that is assigned to make inspections and record the progress of Contractor's performance of the Work. The Inspector has no authority to bind the District to any modification of the Contract Documents or liabilities of any kind.

Materials - Manufactured articles, materials of construction (fabricated or otherwise) and any other classes of material to be furnished in connection with the Contract.

Notice of Award - The official notice from the District that it intends to execute the Contract with the selected responsible, responsive Bidder.

Notice to Proceed - Written notice issued by the District that indicates that the Contractor can mobilize on the Site and begin all, or a designated part, of the Work. Notice to Proceed starts the running of the Contract Time.

Or Equal - Equal or better function, quality and performance to that specified in the Contract Documents. An item is not Or Equal if it is materially different, with respect to other constraints or requirements in the Contract Documents, in size, weight or other aspect from the item specified in the Contract Documents. Similarly, an item is not Or Equal if it is expected to have significantly higher total cost of ownership over the life of the completed Work.

Permit - Any and all permits required to comply with local, State, and Federal laws and regulations in performance of the Work.

Physical Completion - The time at which all of the Work has progressed to the point where (a) Contractor has achieved Substantial Completion, (b) the Contractor has completed all items identified on the Punch List to the District's satisfaction and (c) the Contractor has submitted and the District has accepted all required As-Built Plans.

Plans - All official drawings or reproductions of drawings made or to be made pertaining to the Work provided for in the Contract.

Project - The Work to be constructed in whole or in part through the performance of the Contract.

Project Records - All records that document the performance and/or cost of the Work as well as any materials as more fully defined in Section 8.7 of the General Conditions.

Proposal - The offer of a Bidder, on the prescribed bid form, properly executed, setting forth the price or prices for the Work to be performed.



Punch List - A list(s) of the physical construction that remains to be completed after the achievement of Substantial Completion of the Work, which must be satisfactorily completed in order to attain Physical Completion.

Reference Specifications - The technical specifications of other agencies incorporated or referred to herein.

Request for Information (RFI) - The written document by which the Contractor requests clarification, verification or information concerning a portion of the Work.

Responsible - A responsible Contractor or Subcontractor who complies with the requirements of RCW 39.04.010, 39.04.350, and 39.06.020 and any requirements of any applicable supplemental bidder responsibility criteria and who is determined to have: adequate financial resources to perform the Contract; the ability to comply with the required delivery or performance schedule; a satisfactory performance record; a satisfactory record of integrity; the necessary organization, experience, accounting and operational controls, and technical skills; the necessary construction equipment and facilities; and be otherwise qualified and eligible to be awarded the Contract under applicable laws and regulations.

Schedule - The plan prepared by the Contractor in accordance with the requirements of the Contract and reviewed by the Engineer setting forth the logical sequence of activities required for the Contractor's orderly performance and completion of the Work in accordance with the Contract. The Schedule includes updates – whether by progress schedule(s), recovery schedule(s) or otherwise – required by the Contract.

Shop Drawing - All shop details of structural steel, pipe, machinery, equipment, schedules and bending diagrams of reinforcing steel, and other detail drawings furnished by the Contractor as required and provided for in the Submittal requirements of the Contract Documents.

Site - The location(s) where the Work will be performed or constructed by the Contractor as set forth in the Plans and Specifications. The Site may at the District's option include areas identified by the District for Contractor's logistics or staging but does not include any areas separately secured by the Contractor, a Subcontractor of any tier, or supplier for use in connection with the Work (e.g. Contractor's home office, an off-site fabrication plant, etc.).

Specifications - The written requirements for contract administration, Materials, Equipment, systems, standards, and workmanship for the Work and for the performance of any related services.

Subcontractor - A business entity that has a direct contract with the Contractor to perform a portion of the Work. Unless the context clearly requires otherwise, the term Subcontractor includes all of the Subcontractor's authorized representatives.



Submittal - Written or graphic document (including electronic) or sample that is required by the Contract Documents and is prepared for the Work by the Contractor or a Subcontractor or supplier at any tier, and submitted to the District by the Contractor, including Shop Drawings, product data, samples, certificates, schedules of material or other data. Submittals are not Contract Documents.

Substantial Completion - The stage in the progress of the Work where:

1. The District has full and unrestricted use and benefit of the facilities for the purpose intended;
2. All the systems and parts of the Work are functional;
3. Utilities are connected and operate normally;
4. Only minor incidental Work or correction or repair remains to complete all applicable Contract requirements; and,
5. At the District's option, the Contractor has provided all applicable occupancy Permits and easement releases.

As provided in the Contract, the District at its sole option may also require or grant Substantial Completion to specific Schedules, milestones or subsystems or portions of the Work. The date(s) of Substantial Completion shall be determined, in writing, by the District.

Surety - Any firm or corporation executing a surety bond or bonds payable to the District, securing the performance of the Contract, either in whole or in part.

Work - The construction to be completed under the terms of this Contract as detailed more fully in the Plans and Specifications. Work specifically includes the furnishing of all labor, Materials, Equipment, and all incidentals necessary to the successful completion of the construction, whether expressly required by or reasonably inferable from the Contract Documents, whether they are temporary or permanent, and whether they are incorporated into the finished Work or not. Work also includes all other obligations imposed on the Contractor by the Contract. The Work is sometimes generally referred to as the "Project."

Usage of Certain Words and Phrases - Whenever the words, "as directed", "as required", "as permitted", or words of like effect are used, it shall be understood that the direction, requirement or permission of the District and Engineer is intended. The words, "sufficient", "necessary", "proper", and the like shall mean sufficient, necessary or proper in the judgment of the District and Engineer. The words, "approved", "acceptable", "satisfactory", or words of like import shall mean approved by or acceptable to the District and Engineer.



ABBREVIATIONS

Whenever the following abbreviations are used on the Plans, Specifications, Proposal and Contract, they shall be construed to mean the words and terms as listed below:

A	Acre
AC	Asbestos Cement
AF	Acre-Feet
Adj	Adjust
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AITC	American Institute of Timber Construction
APWA	American Public Works Association
Asp. Pav.	Asphalt Pavement
Asp.Conc.Pav.	Asphalt Concrete Pavement
ASTM	American Society of Testing and Material
ATB	Asphalt Treated Base
AVE	Avenue
AWS	American Welding Society
AWWA	American Water Works Association
Bld	Boulevard
BO	Blow Off
BTU	British Thermal Unit
CB	Catch Basin
CB Inlet	Curb Inlet
CFS	Cubic Feet per Second
CI	Cast Iron
CIP	Cast Iron Pipe
CL	Centerline
CMP	Corrugated Metal Pipe
CMU	Concrete Mason Unit
Conc	Concrete
Conc. Cb.	Concrete Curb
Conc. Pav.	Concrete Pavement
Conc.Ret.Wall	Concrete Retaining Wall
Conc. Swr	Concrete Sewer
Cond.	Conduit
Conn	Connect
Cr	Cross
CTB	Cement Treated Base
Cu	Cubic



ABBREVIATIONS

Continued

DFPA	Douglas Fir Plywood Association
DI	Ductile Iron
Dr	Drive or Driveway
E	East
Elev.	Elevation
Exist.	Existing
Exc	Excavation
FBM	Foot Board Measure
FH	Fire Hydrant
FL	Flange
FT, FT ² , FT ³	Foot, Square Feet, Cubic Feet
GIP	Galvanized Iron Pipe
GPAD	Gallons Per Acre Day
GPH	Gallons Per Hour
GPM	Gallons per Minute
G Stl P	Galvanized Steel Pipe
GV	Gate Valve
Hyd	Hydrant
Hyd Ext	Hydrant Extension
ID	Inside Diameter
In, In ² , In ³	Inch, Square Inch, Cubic Inch
L	Length
Lbs	Pounds
LF	Lineal Feet
Max	Maximum
Mon	Monument Case
Min	Minimum
MG	Million Gallons
MGD	Million Gallons per Day
MH	Manhole
MJ	Mechanical Joint
N	North
NIC	Not in Contract
No.	Number
NRS	Non Rising Stem
OD	Outside Diameter
Pav	Pavement
PC	Point of Curvature
PJM	Premolded Expansion Joint Material



ABBREVIATIONS

Continued

PL	Property Line
Pl	Place
Plk	Planking
Pos	Position
PP	Power Pole
Pri	Primary
Prop	Proposed
PS	Permastran
PSF	Pounds per Square Foot
PSI	Pounds per Square Inch
PT	Point of Tangency
PVC	Polyvinyl chloride
R	Radius
RC	Reinforced Concrete
RCP	Reinforced Concrete Pipe
Rem	Remove
Repl	Replace
RS	Rising Stem
S	South
Sec	Secondary
Swr	Sewer
Sp	Special
Sq	Square
SS	Side Sewer
SSPC	Steel Structure Painting Council
Std	Standard
Stl	Steel
Temp	Temporary
Trans	Transformer
VC	Vertical Curve
W	West
WM	Water Main
Yd	Yard



GENERAL CONDITIONS



TABLE OF CONTENTS

SECTION 8

GENERAL CONDITIONS

8.1	EXECUTION, CORRELATION AND INTENT OF CONTRACT DOCUMENTS	1
8.2	PLANS AND SPECIFICATIONS - OMISSIONS AND DISCREPANCIES.....	1
8.3	EXAMINATION OF SITE OF WORK.....	2
8.4	STATUS OF ENGINEER	2
8.5	INSPECTION AND TESTS	3
8.6	PLANS, SPECIFICATIONS, SUBMITTALS, AND SHOP DRAWINGS ACCESSIBLE; RFIs.....	4
8.7	AUDIT RECORDS	5
8.8	OWNERSHIP OF DOCUMENTS; NO WARRANTIES BY THE DISTRICT ...	6
8.9	INSURANCE	6
8.10	SCHEDULE AND PRE-CONSTRUCTION CONFERENCE	10
8.11	SCHEDULE OF VALUES OF LUMP SUM WORK	11
8.12	MATERIALS AND EQUIPMENT FURNISHED BY CONTRACTOR.....	12
8.13	MATERIALS AND EQUIPMENT FURNISHED BY DISTRICT	13
8.14	SUBMITTALS	14
8.15	LABOR AND FACILITIES	15
8.16	ROYALTIES AND PATENTS	16
8.17	PROJECT SITE; PERMITS, LAWS, AND REGULATIONS	16
8.18	PAYMENT OF PREVAILING WAGES	17
8.19	PROTECTION OF WORK, PERSONS, AND PROPERTY	18
8.20	SAFETY.....	19
8.21	UTILITIES.....	19
8.22	DISTRICT-INITIATED CHANGES IN THE WORK.....	21
8.23	CONTRACTOR REQUESTS FOR CHANGE / CLAIMS.....	21
8.24	DIFFERING SITE CONDITIONS	24
8.25	FORCE ACCOUNT.....	24
8.26	DELAYS AND EXTENSION OF TIME.....	28
8.27	COMPLETION AND/OR CORRECTION OF WORK.....	30



8.28 DEFECTS ARISING IN TWO YEARS AND REMEDIES 31

8.29 SUSPENSION OF WORK 31

8.30 DISTRICT'S RIGHT TO TERMINATE CONTRACT FOR DEFAULT 32

8.31 DISTRICT'S RIGHT TO TERMINATE CONTRACT FOR
CONVENIENCE 34

8.32 CONTRACTOR'S OBLIGATIONS DURING TERMINATION 35

8.33 USE OF COMPLETED PORTION OF WORK..... 36

8.34 APPLICATION FOR PAYMENT 36

8.35 PROGRESS PAYMENTS 37

8.36 FINAL PAYMENT 38

8.37 ACCEPTANCE AND RELEASE OF RETAINAGE 38

8.38 DISTRICT'S RIGHT TO WITHHOLD PAYMENTS 39

8.39 HOLD HARMLESS AGREEMENT 40

8.40 PERFORMANCE AND PAYMENT BOND 41

8.41 ASSIGNMENT AND SUBCONTRACTING 42

8.42 SEPARATE CONTRACT - INTERFERENCE WITH OTHER
CONTRACTORS 42

8.43 CLEANUP 43

8.44 PROPERTY RESTORATION RELEASE 43

8.45 PREVENTION OF ENVIRONMENTAL POLLUTION 43

8.46 VENUE/LIMITATION 43



Section 8 – General Conditions

8.1 EXECUTION, CORRELATION AND INTENT OF CONTRACT DOCUMENTS

The Contract Documents are complementary and what is called for by any one shall be as binding as if called for by all. The intent of the Contract Documents is to prescribe the complete Work. The Contractor shall furnish all labor, Materials, Equipment and incidentals necessary to complete all parts of the Work. Where the Contractor is directed to provide something as part of the Work, that term specifically includes everything necessary to furnish, install, connect, adjust, test and make ready for use or occupancy. Compensation for the cost of the complete Work and for full performance of the Contract is included in the Contract Price. Materials, Equipment, or Work described in words which so applied have a well-known technical or trade meaning shall be held to refer to such recognized standards.

It is intended that Work not covered under any heading, section, branch, class or trade of the Specifications shall be supplied if it is shown on Plans or is reasonably inferable as being necessary to produce the intended results. Minor items of Work, Materials, or Equipment omitted from the original Plans or Specifications, but clearly inferable from the information presented and which are called for by accepted good practice shall be provided and/or performed by the Contractor as part of its original cost.

Where the Contract Documents refer to Reference Specifications, such specifications shall be applicable to technical provisions only, unless otherwise designated.

The Contract represents the entire and integrated agreement between the District and the Contractor. It supersedes all prior discussions, negotiations, representations or agreements pertaining to the Work, whether written or oral.

8.2 PLANS AND SPECIFICATIONS - OMISSIONS AND DISCREPANCIES

Upon receipt of Notice of Award of the Contract, the Contractor shall carefully study and compare all Plans, Specifications and other instructions and shall, prior to ordering Materials or performing Work, report in writing to the Engineer any error, inconsistency or omission in respect to design, mode of construction or cost which the Contractor may discover. If the Contractor, in the course of this study or in the accomplishment of the Work, finds any discrepancy between the Plans and the physical condition of the locality as represented in the Plans, or any such errors or omissions in respect to design, mode of construction or cost in Plans or in the layout as given by points and instructions, it shall be its duty to provide timely notice thereof in accordance with Section 8.23 below. The Contractor shall



make all reasonable efforts to mitigate any impact resulting from such error, inconsistency, omission or variance. Any Work done after such discovery, until correction of Plans or authorization of extra Work is given, if the Engineer finds that extra Work is involved, will be done at the Contractor's risk. If extra Work is involved, the procedure shall be as provided in Section 8.23 below.

8.3 EXAMINATION OF SITE OF WORK

Before submitting its bid, the Contractor shall examine the Site of the Work and ascertain for itself all the physical conditions in relation thereto. In making a Proposal under these Contract Documents, the Contractor represents and warrants that it has satisfied itself as to construction conditions by personal examination of the Plans, Specifications and Site of the proposed Work, and by appropriate examination and investigation as to the nature of the soil and construction problems which may be encountered by reason thereof. Contractor also warrants and represents itself to be experienced and an expert in the construction contemplated. Contractor further understands that, in making the Contract award, District is relying upon the representations and warranties of Contractor herein contained.

Contractor's failure to examine the Plans, Specifications, and Site shall not relieve the Contractor from entering into a Contract nor excuse it from performing the Work in strict accordance with the terms of the Contract and Specifications. The Contractor will not be entitled to additional compensation if it subsequently finds the conditions to require other methods or equipment that it did not anticipate in making its Proposal. Any statement or representation (whether written or oral) made by an officer, agent or employee of the District (or by any third party consultant of the District) with respect to the physical or geotechnical conditions at the Site of the Work shall not be binding upon the District.

8.4 STATUS OF ENGINEER

- (a) The Engineer shall act as advisor and consultant to the District in engineering matters relating to the Contract; provided, however, nothing contained herein or elsewhere in the Contract Documents shall be construed as requiring or authorizing the Engineer to direct the method or manner of performing any Work by the Contractor under this Contract. The Engineer has authority to stop the Work whenever, in its opinion, such stoppage may be necessary to ensure the proper execution of the Contract. The Engineer may reject all Work, Materials, or Equipment which, in its opinion, do not conform to the Contract.
- (b) It is understood and agreed by and between the parties hereto that the Work included in the Contract is to be done to the complete satisfaction of the Engineer, and that the decision of the Engineer as to the true construction and meaning of the Contract, Plans, Specifications and estimates, and as to all questions arising as to proper performance of the



Work shall be final. The Engineer shall determine the unit quantities and the classification of all Work done and Materials and Equipment furnished under the provisions of this Contract and its determination thereof shall be final and conclusive and binding upon the Contractor.

- (c) The Engineer shall decide any and all questions which may arise as to the quality or acceptability of Materials and Equipment furnished and Work performed and as to the rate of progress of the Work, and all questions as to acceptable fulfillment and performance of the Contract on the part of the Contractor and as to compensation. The decision of the Engineer in such matters shall be final.
- (d) The Engineer shall have authority to make changes in the Work, not inconsistent with the purpose of the Work. Except in any emergency endangering life or property, no extra Work or change shall be made unless pursuant to a Change Order executed by the Engineer. If the District or Contractor believes that a Change Order justifies an adjustment in the Contract Price and/or Contract Time, the value of any such extra Work shall be determined as set forth in Sections 8.22 and 8.23.
- (e) The Engineer has no authority to waive the obligation of the Contractor to perform the Work in accordance with the Contract Documents. Failure or omission on the part of the Engineer to reject unsuitable, inferior or defective Work and/or labor or Materials or Equipment furnished under the Contract shall not release the Contractor or its bond from performing the Work in accordance with the Contract Documents.

8.5 INSPECTION AND TESTS

- (a) All Work and all Materials and Equipment furnished shall be subject to inspection by the Engineer and/or Inspector. The Engineer and/or Inspector shall, at all times, have access to the Work to observe the progress and quality wherever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and for necessary inspection and testing. If any Work should be covered up without approval or consent of the Engineer or Inspector, it must, if required by the Engineer, be uncovered for inspection at the Contractor's expense.
- (b) The Contractor shall make reasonable tests of the Work at the Contractor's expense upon Engineer's request and shall maintain a record of such tests. Prior to the time scheduled for a performance test to be observed by the Engineer, the Contractor shall make whatever preliminary tests are necessary to assure that the Work is in accordance with the Specifications. If, for any reason, the test observed by the Engineer is unsatisfactory, the Contractor shall pay all costs incurred by the Engineer for the inspection of the unsatisfactory test.



- (c) Inspections, tests, measurements, or other acts or functions performed for or by the District are recognized as being solely to assist the Engineer in determining that the Work complies with the Contract requirements. Such activities shall in no manner whatsoever be construed to relieve the Contractor from the responsibility for performing its own inspections and tests as necessary to ensure compliance with the Contract. In addition, any inspection, test or measurement by or for the District does not constitute or imply acceptance of the Work by the District or waive any rights of the District to require the Work be completed in strict accordance with the Contract and does not impair the District's authority to reject non-conforming Work or evoke any remedy to which it may be entitled.
- (d) The Work may be subject to inspection by various governmental agencies or utility owners. The Contractor shall cooperate and make the Site available for all such persons or agencies with regard to their inspections, including providing access for inspection by way of safe and proper facilities. Such inspection shall in no way make such agencies or persons parties to this Contract and shall not constitute an interference with the Work or the rights of either the District or the Contractor. In its scheduling and planning the Contractor shall allow sufficient time for such inspections. Required certificates of inspection by any authority other than the Engineer shall be secured by the Contractor.
- (e) Except as provided herein, the District will at its cost observe performance of the Work during normal working days or hours during the Contract Time and any modification or extension of the Contract Time authorized by the District in approved Change Orders. If the Contractor is authorized by the District to work more than 8 hours per Day, or more than 5 Days per week, or on holidays, during the course of the Contract Time, then Section 2.1 of the Special Provisions governs.

8.6 PLANS, SPECIFICATIONS, SUBMITTALS, AND SHOP DRAWINGS ACCESSIBLE; RFIs

The Contractor shall keep at least one copy of the Plans, Specifications, Submittals, and Shop Drawings constantly accessible at the construction Site.

If the Contractor discovers, or in the exercise of reasonable diligence should have discovered, that the Work to be performed is not sufficiently detailed or explained in the Contract Documents, or that there is a conflict or inconsistency between any part of the Contract Documents, the Contractor shall promptly apply to the Engineer for such further written explanation(s) as may be necessary using a Request for Information (RFI) form to be provided or approved by the Engineer. The Engineer will address the RFI in writing. Before submitting a RFI, the Contractor shall diligently and thoroughly examine the Contract Documents. The Contractor shall also plan its Work in an efficient manner so as to allow for timely



responses to RFIs. If requested by the Engineer, the Contractor shall prioritize its RFIs and explain the reasons for such priority. District will reply to the RFI with reasonable promptness which on average is defined to mean twenty (20) Days. If Contractor submits an RFI on an activity and reasonably believes that a response from District within up to twenty (20) Days will cause a delay to the Work, Contractor shall denominate such particular RFI as "Priority" and indicate Contractor's preferred reasonable response date. Responses by the District to RFIs are not changes to the Contract. If Contractor believes a response to an RFI constitutes changed Work or causes an adverse impact to performance of the Work or construction schedule, the Contractor is required to submit a request for change in accordance with the requirements of the Contract.

8.7 AUDIT RECORDS

- a) The Contractor and all Subcontractors shall keep and maintain comprehensive records and documentation relating to the Work under this Contract, as well as documents related to the Contractor's Proposal and Project cost accounting records for this Contract, for an audit period of six (6) years. The Project Records shall include, but are not limited to, Contract Documents, subcontracts, purchase orders, employment records, payrolls, Project cost accounting records, prevailing wage records, Plans, Specifications, Addenda, Submittals, Shop Drawings, Change Orders and all working documents leading to Change Orders, field test records, quality control documents, daily construction logs by all field supervisors and Project management personnel, correspondence relating to the Contract, and As-Built Plans.
- b) Contractor and its Subcontractors shall segregate and separately record at the time incurred all costs resulting in any way from any event, act, omission or condition for which Contractor or its Subcontractors seek an adjustment to the Contract Price, Contract Time and/or monetary compensation of any kind. Any costs claimed to be delay or impact costs, acceleration costs, loss of productivity or inefficiency costs, increased costs of onsite or home office overhead or any similar costs shall be separately recorded at the time and shall be fairly and accurately allocated to each such event, act, omission or condition and to other causes of such costs. The Contractor shall be entitled to make a Claim or obtain extra compensation for any such event, act, omission or condition only to the extent the Project Records are kept in full compliance with all Contract requirements and the cost allocations support entitlement to such compensation.
- c) The Contractor and Subcontractors shall permit the District to audit, inspect, examine, and copy the Project Records and/or other documents related to any Claim or issue related to performance of the Work maintained by Contractor (including all Proposal documentation) or any affiliated company involved in the project (collectively, "Audit Records") at any reasonable time



and shall provide such assistance as may be reasonably required in the course of such inspection, including the right to interview personnel. The Contractor shall in no event dispose of, destroy, alter, or mutilate said Audit Records in any manner whatsoever for six (6) years after final payment and until all pending matters are closed. No additional compensation will be provided to the Contractor for compliance with the requirements of this subsection.

8.8 OWNERSHIP OF DOCUMENTS; NO WARRANTIES BY THE DISTRICT

All Plans, Specifications and copies thereof prepared or furnished by the District are its property. They are not to be used on other work.

The Reference Documents and any other information, records, or reports that may be made available by the District to the Contractor are provided solely for the convenience of the Contractor. The District makes no representations or warranties, express or implied, regarding the content of the Reference Documents or any other information, records, or reports. No information derived from inspection of Reference Documents or other information, records, or reports will in any way relieve the Contractor from its responsibility to properly perform its obligations under the Contract. The Contractor shall make its own conclusions and interpretations from the data supplied, information available from other sources, and the Contractor's own observations.

8.9 INSURANCE

The Contractor shall obtain and keep in force during the term of the Contract, Commercial General Liability insurance policies with insurance companies which have an A.M. Best's rating of A VII or better and who are approved by the Insurance Commissioner of the State of Washington pursuant to Title 48 RCW.

Prior to the execution of the Contract, the Contractor shall purchase and maintain during the term of this project a Commercial General Liability insurance policy meeting the requirements set forth herein. The Contractor shall file with the District either a certified copy of all policies with endorsements attached, or a certificate of insurance with endorsements attached as are necessary to comply with these specifications. Failure of the Contractor to fully comply with the requirements regarding insurance will be considered a material breach of Contract.

The Contractor shall not begin Work under the Contract or under any special condition until all required insurances have been obtained and until such insurances have been approved by the District. Said insurance shall provide coverage for the Contractor, its Subcontractors and the District. The coverage so provided shall protect against claims from bodily injuries, including accidental death, as well as claims for property damage which may arise from any act or



omission of the Contractor, its Subcontractors, or by anyone directly or indirectly employed by either of them.

The insurance policies shall specifically name the District, its elected or appointed officials, officers, employees, volunteers and King County (or as needed – City of Kenmore, Bothell, Kirkland, Lake Forest Park, etc.), as insured(s) with regard to damages and defense of claims arising from:

- Activities performed by or on behalf of the Contractor; and
- Products and completed operations of the Contractor; and
- Premises owned leased or used by the Contractor.

It is hereby understood and agreed that Northshore Utility District, its commissioners, officers, and employees, while acting within the scope of their duties as such, are named as additional insured. The insurance shall be maintained in full force and effect at the Contractor's expense throughout the term of the Contract and for any extended period after Acceptance as may be required hereunder.

The District shall be given at least 45 Days' written notice of cancellation, non-renewal, material reduction or modification of coverage. Such notice shall be by certified mail to the District.

The coverages provided by the Contractor's insurance policies are to be primary to any insurance maintained by the District. Any insurance that might cover this Contract which is maintained by the District shall be in excess of the Contractor's insurance and shall not contribute with the Contractor's insurances.

The Contractor's insurance policies shall protect each insured in the same manner as though a separate policy had been issued to each. The inclusion of more than one insured shall not affect the rights of any insured as respects any claim, suit or judgment made or brought by or for any other insured or by or for any employee of any other insured. However, this provision shall not increase the limits of the insurer's liability.

The General Aggregate provision of the Contractor's insurance policies shall be amended to show that the General Aggregate Limit of the policies applies separately to this Project.

The Contractor's insurance policies shall not contain deductibles or self-insured retentions in excess of \$10,000 (unless approved by the District) and Contractor shall be responsible for any such deductible or SIR if the loss arises from its operations or those of its Subcontractors or suppliers at any tier.



The Contractor's insurance policies shall contain a provision that the District has no obligation to report events which might rise to a claim until a claim has been filed with the District's Board of Commissioners.

Types and Limits of Insurance Required:

Commercial General Liability

- \$1,000,000 each occurrence Bodily Injury and Property Damage Liability.
- \$2,000,000 annual aggregate
- Employees and volunteers as Additional Insured(s)
- Premises and operations
- Broad form property damage including:
 - Underground
 - Explosion
 - Collapse Hazards (XCU)
 - Products completed operations
 - Blanket contractual
 - Subcontractors
- Personal injury with employee exclusion deleted
- Employers liability (Stop gap)

Automobile Liability

- \$1,000,000 per accident bodily injury and property damage liability, including:
 - any owned automobiles,
 - hired automobiles,
 - non-owned automobile.

Umbrella Liability

- \$2,000,000 per occurrence
- \$2,000,000 aggregate

Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" policy form in the amount of the Contract Price, as adjusted by Change Orders. This insurance shall include interests of the District, the Contractor and Subcontractors on the Project. Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage,



theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements. Maximum deductible shall be \$10,000 and Contractor shall be responsible for such deductible if the loss arises from its operations of those of any Subcontractor.

District, Contractor and Subcontractors waive all rights against each other for damages caused by fire or other causes of loss to the extent of proceeds actually paid by property insurance obtained pursuant to this Section 8.9 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the District as fiduciary. The District or Contractor, as appropriate, shall require Subcontractors, by appropriate agreements, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

As an alternative to the above indicated Commercial General Liability and Umbrella Liability insurance policies the Contractor may provide the District with an Owners and Contractors Protective (OCP) policy with a limit of coverage of \$5,000,000 on terms and conditions acceptable to the District.

The Contractor shall additionally provide the District with evidence that the District has been named as additional insured on the Contractor's Commercial General Liability Policy through Acceptance plus six (6) additional years (inclusive of completed operations coverage).

Providing of coverage on the stated amounts shall not be construed to relieve the Contractor from liability in excess of such limits.

In addition, the Contractor shall have its insurance agent/representative complete the Insurance Coverage Questionnaire contained in the Special Provisions and attach it to the Certificate of Insurance for District's approval. The Contractor shall maintain Workers Compensation insurance and/or Longshore and Harbor Workers insurance as required by State or Federal statute for all of its employees to be engaged in Work on the Project under this Contract and, in case any such Work is sublet, the Contractor shall require the Subcontractor similarly to provide Workers Compensation insurance and/or Longshore and Harbor Workers Insurance for all of the latter's employees to be engaged in such Work. The Contractor's Department of Labor & Industries account number shall be noted on the certificate of insurance.

In the event any class of employees engaged in the Work under this Contract is not covered under Workers Compensation insurance or Longshore and Harbor Workers insurance as required by State and Federal statute, the Contractor shall



maintain and cause each Subcontractor to maintain, Employers Liability insurance for limits of at least \$1,000,000 each employee for disease or accident, and shall furnish the District with satisfactory evidence of such.

The contractual coverage of the Contractor's policy shall be sufficiently broad enough to insure the provisions of the HOLD HARMLESS AND INDEMNIFICATION AGREEMENT of this Contract.

Nothing contained in these insurance requirements is to be construed as limiting the extent of the Contractor's responsibility for payment of damages resulting from its operations under this Contract.

8.10 SCHEDULE AND PRE-CONSTRUCTION CONFERENCE

- (a) The Schedule shall set forth the order in which the Contractor plans to perform the Work. The Schedule and any supplemental Schedule shall show:
1. Substantial Completion of all Work within the specified Contract Time,
 2. The proposed order of Work, and
 3. Projected starting and completion times for major phases of the Work and for the total Project.

The Schedule shall also reflect any phasing, sequencing, or timing restrictions set forth in the Contract Documents.

The District allocates resources to a Contract based on the total time allowed in the Contract. The District will accept a Schedule indicating an early Substantial Completion date, but cannot guarantee the District's resources will be available to meet the accelerated Schedule. No additional compensation will be allowed if the Contractor is not able to meet its accelerated Schedule due to the unavailability of the District's resources or for other reasons beyond the District's control.

The Contractor shall submit supplemental Schedules when requested by the Engineer or as required by any provision of the Contract. The supplemental Schedules shall reflect any changes in the proposed order of Work, any construction delays, or other conditions that may affect the progress of the Work. The Contractor shall provide the Engineer with the supplemental Schedules within ten (10) Days of receiving written notice of the request.

The original and all supplemental Schedules shall not conflict with any time and order-of-work requirement in the Contract.



If the Engineer deems that the original or any necessary supplemental Schedule does not provide the information required in this subsection, the District may withhold progress payments until a Schedule containing the required information has been submitted by the Contractor and approved by the Engineer.

- (b) The Schedule may be in graph or tabular form and shall include the date of submission for approval of Plans as may be required, starting dates for construction of the several parts of the Work, and estimated completion dates of such parts, and completion date of the Project. Review by the Engineer of the Schedule shall not in any event excuse the Contractor of the obligation to complete the Work within the time specified in the Contract or of complying with all terms, conditions and provisions of the Contract Documents. Failure of the Contractor to follow the Schedule submitted and accepted, including revisions thereof, shall relieve the District of any and all responsibility for furnishing and making available all or any portion of the Site from time to time and will relieve the District of any responsibility for delays to Contractor in the performance of the Work.
- (c) A pre-construction conference shall be held at a time and place fixed by the Engineer which will generally be within one month from date of Notice of Award. The Contractor must be prepared for a thorough discussion and review of the following:
- Schedule
 - Materials and Equipment
 - Traffic Control
 - Job Procedures
 - Inspection Procedures
 - Plans and Specifications
 - Shop Drawings
 - Schedule of Values of Lump Sum Work
 - Safety
 - Other Matters pertaining to Performance of the Work

8.11 SCHEDULE OF VALUES OF LUMP SUM WORK

If payments are to be made on lump sum items, the Contractor shall submit a schedule of values of the various parts of the Work, including quantities, aggregating the total Contract Price. When approved by the Engineer, the schedule of values shall be used as the basis for certificates for payment unless it is found to be in error. In applying for payments for lump sum Work, the Contractor shall submit estimates of the percentage of Work completed and payment will be based upon the schedule of values for lump sum Work.



8.12 MATERIALS AND EQUIPMENT FURNISHED BY CONTRACTOR

The Contractor shall furnish all Materials and Equipment for the completion of the Work to be performed under this Contract and shall be fully responsible for all Materials and Equipment until the completed Project is delivered to and accepted by the District.

The Contractor shall, at its own expense, secure and maintain a storage place for Materials and Equipment. Contractor shall protect Materials and Equipment against damage from careless handling, exposure to weather, mixture with foreign matter, and all other causes. The District will reject and refuse to test Materials and Equipment improperly handled or stored.

- (a) All Materials and Equipment required to be incorporated into the Work shall be new and in accordance with the Plans and Specifications, except as otherwise provided in the Contract Documents. All such Materials and Equipment shall be applied, installed, connected, erected, used, cleaned, maintained and conditioned in accordance with the instructions of the applicable manufacturer, fabricator or processor, except as otherwise provided in the Contract Documents. Upon the request of the Engineer, the Contractor shall furnish satisfactory evidence as to the kind, quality and manufacturer of Materials and Equipment. The Contractor shall furnish the District with copies of the supplier's warranty and adopt the same as the warranty of the Contractor and shall also be liable thereon to the District.
- (b) The Contractor shall furnish for approval all samples as directed by the Contract Documents. The finished Work shall be in accordance with approved samples. Approval of samples by the Engineer does not relieve the Contractor of performance of the Work in accordance with the Contract Documents.
- (c) Substitutions requested by the Contractor will be subject to the District's prior written acceptance and at the District's sole discretion. For each proposed substitution, the Contractor shall submit samples, descriptive and technical data, and reports of tests to the District for approval. The Contractor shall also indicate the difference in Contract Price and/or Contract Time by reason of the proposed substitutions. All costs of any redesign or modification to other systems, parts, equipment or components of the Project or Work, which result from the substitution, shall be borne by the Contractor.
- (d) When the District approves a substitution proposed by the Contractor, the Contractor shall guarantee the substituted Materials or Equipment to be equal to, or better than, those originally specified and shall be compatible with all other systems, parts, Materials, Equipment, or components of the Project and Work. The District has the right to order an unaccepted,



substituted article removed and replaced without additional cost to the District.

- (e) When Materials or Equipment are specified by one or more patents, brand names, or catalog numbers, it shall be understood that this is for the purpose of defining the performance or other salient requirements and shall, unless otherwise expressly stated, be understood as if followed by the words Or Equal whether or not such words appear. If the Contractor proposes to furnish Or Equal Materials or Equipment, then Contractor shall demonstrate (1) conformance to the specified performance, testing, quality, life-cycle or dimensional requirements and (2) suitability of the Materials or Equipment for the use intended. Intended use of any Or Equal Materials or Equipment shall be specifically identified as part of the submittal process, and the Engineer must accept the Contractor's proposed Or Equal Materials or Equipment before it may be used. Any such acceptance shall not relieve Contractor of its obligations to achieve the specified performance, testing, quality, life-cycle or dimensional requirements and suitability of any accepted the Or Equal Materials or Equipment for the use intended under this Contract.
- (f) In the event that the Contractor proposes an alternate design or designs for some portion of the Work, the District may at its option allow the Contractor to proceed on the condition that the Contractor assume full responsibility for the alternate design.

8.13 MATERIALS AND EQUIPMENT FURNISHED BY DISTRICT

- (a) Unless otherwise specifically provided in the Contract Documents, if the Contract requires that the Contractor install Materials and Equipment provided by the District, in the absence of a reasonably apparent defect, such Materials and Equipment shall be considered compliant with the Contract Documents.
- (b) If the Contractor discovers defects in the District-furnished Materials or Equipment the Contractor shall immediately notify the District in writing.
- (c) After such discovery, the Contractor shall not proceed with Work involving such District-furnished Materials and Equipment unless otherwise authorized in writing by the District.
- (d) Contractor's failure to provide immediate written notice of any defects in District-furnished Materials or Equipment shall constitute acceptance of such Materials and Equipment as fit for incorporation into the Work.
- (e) Contractor shall be responsible for any damages or delays resulting from Contractor's failure to provide timely written notice or Contractor's improper



incorporation of such defective District-furnished Materials or Equipment into the Work.

8.14 SUBMITTALS

- (a) The Contractor shall perform no portion of the Work requiring Submittals until the Submittals have been reviewed and returned by the District with one of the following annotations: (1) "No Exception Taken" or (2) "Make Corrections Noted" or (3) "Revise and Resubmit" or (4) "Rejected" or (5) "Submit Specified Item".
- (b) Prior to furnishing the Submittals to the District, the Contractor shall: (1) review all Contractor and Subcontractor Submittals for accuracy, completeness, and compliance with the Contract; (2) coordinate all Submittals with all Contract Work by other trades and with field measurements; and (3) indicate approval on the Submittals as a representation that it has complied with its obligation to review and coordinate Submittals. Where required by law or by the Contract, an appropriate licensed professional shall stamp Submittals. Submittals lacking required stamps or evidence of Contractor review and approval will be returned without review by the District for resubmission. Submittals shall be sequentially numbered.
- (c) When submitting information, the Contractor shall identify and state reasons for any alteration, variation, addition, deviation, or omission from the Contract. The Contractor shall not perform work that alters, varies, adds, deviates, or omits Work without prior specific written acceptance by the District.
- (d) The Contractor shall provide Submittals with reasonable promptness and in such sequence as to facilitate the timely completion of the Contract. The Contractor shall prepare and keep current, for review by the District, a schedule of Submittals which is coordinated with the Contractor's Project Schedule and allows the District reasonable time for review.
- (e) The District shall review the Contractor's Submittals and respond in writing with reasonable promptness. Unless otherwise agreed, no delay to the Contractor's Work shall be attributable to the failure by the District to respond to a Submittal until thirty (30) Days after the Submittal is received by the District, and then only if failure by the District to respond is unreasonable and affects the Substantial Completion date.
- (f) If the Contractor is required to resubmit a Submittal, any revisions on resubmittals, shall be specifically identified in writing and the resubmitted Submittal shall be sequentially alpha denoted and note revisions in numerical order. The cost of the review of the initial Submittal and the first revised Submittal shall be borne by the District. The costs of all additional



revised Submittals shall be charged to the Contractor. The cost of review shall include, without limitation, administrative, design, and engineering activities directly related to review of Submittals. The District may deduct these costs from any amounts due the Contractor.

- (g) The District shall review the Contractor's Submittals only for conformance with the design of the Work and compliance with the Contract Documents. Review of the Submittals are not conducted to verify the accuracy of dimensions, quantities, or calculations, the performance of Materials, systems, or Equipment, or construction means, methods, techniques, sequences, or procedures, all of which remain the Contractor's responsibility. Failure by the District to take exception to a Submittal shall not relieve the Contractor from any duty, including its responsibility for errors or omissions in Submittals, its duty to make Submittals and its duty to perform the Work according to the requirements of the Contract. The District's review of a Submittal shall not alter or waive the requirements of the Contract unless the District has issued prior written approval of such change or alteration of the Contract requirements.
- (h) The Contractor's failure to identify any error, deviation, or omission and subsequent acceptance of the Submittal by the District shall not relieve the Contractor from the obligation to comply with the all requirements in the Contract Documents.

8.15 LABOR AND FACILITIES

- (a) The Contractor shall provide and pay for all labor, water, tools, light, power, transportation and other facilities necessary for the execution and completion of the Work, except as otherwise stipulated in the Contract Documents.
- (b) Necessary sanitation conveniences for the use of workmen on the Site, properly secluded from public observation, shall be provided and maintained by the Contractor.
- (c) The Contractor shall, at all times, enforce strict discipline and good order among its employees and shall not employ on the Work any person unfit or not skilled in the Work assigned to him. At the Engineer's written request, the Contractor shall immediately remove and replace any incompetent, careless, or negligent employee.
- (d) The Contractor shall remain onsite whenever the Work is under way. Before the Work begins, the Contractor shall name in writing an experienced superintendent who understands the Contract and is able to continuously supervise the Work. This superintendent shall have full authority to represent and act for the Contractor. Any superintendent who repeatedly fails to follow the Engineer's written or oral orders, directions, instructions, or determinations shall be subject to removal from the Project.



Upon the written request of the Engineer, the Contractor shall immediately remove such superintendent and name a replacement in writing.

- (e) During the term of this Contract, neither party shall employ nor hire any employee of the other party, nor of the Engineer, without the written consent of the other party or of the Engineer. The Contractor shall not use any Work performed or any information obtained from any employee hired in violation of this provision in making a claim against the District or Engineer and shall also be liable to the District as liquidated damages in an amount equal to double the amount of salary or wages paid to any such employee so hired in violation hereof.

8.16 ROYALTIES AND PATENTS

The Contractor shall be liable for all suits brought against the District by reason of infringement of patent rights or licenses on any Materials, Equipment, or process used on the Work or incorporated into the finished Project, except where specifically exempted by the Special Provisions. Prices named in the Proposal shall include payment of royalties, if any. Contractor shall defend and hold District harmless from any such suit, costs of defense and any judgment which may be made or entered against District thereon.

8.17 PROJECT SITE; PERMITS, LAWS, AND REGULATIONS

The District will furnish the Site and rights-of-way necessary for carrying out this Contract and completion of the Work herein contemplated and will use due diligence in acquiring said lands and rights-of-way as speedily as possible. If the District's right of access to any lands for the Site, Permits, or rights-of-way is delayed for any reason, Contractor shall exercise reasonable efforts to mitigate consequences and work around the delay. If Contractor believes it is entitled to a change in the Contract Time and/or Contract Price by reason of such delay, Contractor shall comply with the notice and Claim requirements provided in Section 8.23. Nothing in this section shall limit the District's right to terminate as provided in Section 8.31.

Contractor's Work shall be confined to the District's premises, including easements and construction Permit limits. The Contractor shall not enter upon or place Materials or Equipment on other property except by written consent of the individual property owners and the Contractor shall save District harmless from all suits and actions of every kind and description that might result from its use of property other than that of the District.

The Contractor shall be responsible for obtaining all Permits except those specified herein or in the Special Provisions.

The Contractor shall keep fully informed concerning all governmental requirements, including but not limited to all State, Federal, county and municipal laws, ordinances and regulations which in any manner affect the performance of



the Work or the Materials and Equipment used in the Work, or which in any way affect those employed to work in connection with the Project, and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same including the specific legal requirements referenced in the Contract Documents (collectively, the “Governmental Requirements”). The Contractor shall at all times comply with, and shall cause all the Contractor’s agents, employees and Subcontractors to comply with all such Governmental Requirements, and shall indemnify, defend and hold harmless District and all of its commissioners, officers, agents, and employees against all claims, liabilities, losses, damages and expenses (including attorney’s fees and related costs) arising from or based on the violation of any such Governmental Requirement whether by the Contractor or contractor’s agents, employees or Subcontractors. If any discrepancy or inconsistency is discovered in the Contract Documents for the work in relation to any such Governmental Requirements, the Contractor shall immediately report the same to the Engineer in writing.

Wherever the law of the place of construction requires a sales, consumer, use or similar tax, the Contractor shall pay such tax.

8.18 PAYMENT OF PREVAILING WAGES

The wage rates to be paid all laborers, workers and mechanics who perform any part of this Contract shall meet or exceed the prevailing wage rates as required by Chapter 39.12 of the Revised Code of Washington, as amended. This requirement applies to laborers, workers and mechanics whether they are employed by the Contractor, Subcontractors, sub-Subcontractors, or any other person who performs a portion of the Work contemplated by this Contract.

The current prevailing wage rates as provided to the District by the Industrial Statistician of the Washington State Department of Labor and Industries are included and incorporated in the Contract Documents. In referencing such rates, the District does not imply or warrant that the Contractor will find labor available at those rates. It is the Contractor’s sole responsibility to determine the wage rates it will actually have to pay.

In case any dispute arises as to what are the prevailing rates of wages for work of a similar nature and such dispute cannot be adjusted by the parties in interest, including labor and management representatives, the matter shall be referred for arbitration to the Director of the Department of Labor and Industries of the State and the Director’s decision therein shall be final and conclusive and binding on all parties involved in the dispute, as provided for by Section 39.12.060 of the Revised Code of Washington, as amended.

In connection with this Contract, the Contractor will be required, pursuant to Section 39.12.040 of the Revised Code of Washington to file with the District a “Statement of Intent to Pay Prevailing Wages” and an “Affidavit of Wages Paid” for itself and all Subcontractors and sub-Subcontractors. The Statements require the



“approval” of, and the Affidavits the “certification” of, the industrial statistician of the State Department of Labor and Industries before the Statements or Affidavits are to be presented to the District. The Department of Labor and Industries charges a fee for such approval and certification, which fee shall be paid by the Contractor. Any change in the fee will not be grounds for revision in Contract Price.

All workers delivering fill, sand, gravel, crushed rock, transit/concrete mix, asphalt or other similar Materials and all workers removing any Materials from the Site as required by the Specifications are subject to the provisions of RCW Chapter 39.12 and are entitled to the appropriate prevailing wage rate. For purposes of this Contract, such Materials are for specified future use and per WAC 296-127-018, delivery and pick-up of the above listed Materials constitutes incorporation.

The Contractor is required to include this provision in all subcontracts and shall require that it be placed in all sub-subcontracts at any tier.

8.19 PROTECTION OF WORK, PERSONS, AND PROPERTY

The Contractor shall be solely and completely responsible for conditions of the Site, including protecting all persons and property, during performance of the Work. The Contractor shall maintain the Site and perform the Work in a manner which meets all statutory and common law requirements or other specific contractual requirements for the provision of a safe place to work and which adequately protects the safety of all persons and property on or near the Site. This obligation shall apply continuously and shall not be limited to normal working hours. The District’s inspection of the Work or presence at the Site does not and shall not be construed to include review of the adequacy of the Contractor’s safety measures in, on or near the site of the Work.

Unless otherwise required in the Contract Documents, the Contractor shall protect and be responsible for any damage or loss to the Work, or to the Materials and Equipment associated with the Work until the date of Substantial Completion. The Contractor remains responsible for any damage or loss caused directly or indirectly by the acts or omissions of the Contractor, Subcontractors, suppliers or third parties authorized or allowed on the Site by the Contractor until Acceptance. The Contractor shall repair or replace without cost to the District any damage or loss that may occur, except damages or loss caused by the acts or omissions of the District.

Contractor shall take adequate precautions to protect existing lawns, trees and shrubs, sidewalks, curbs, pavements, adjoining property, and structures, and to avoid damage thereto. The Contractor shall, at its own expense, completely repair any damage thereto caused by its operations to the satisfaction of the Engineer, except as otherwise provided elsewhere in the Contract Documents. The Contractor shall be solely and completely responsible for damages arising from the Work that affect property adjacent to the Site.



Whenever it is necessary in the course of construction to remove or disturb culverts, driveways, roadways, pipelines, or other existing improvements, without limiting the generality thereof and whether on private or public property, they shall be replaced to a condition equal to that existing before they were so removed and disturbed and all such costs for this replacement shall be borne by the Contractor and considered incidental to the construction and Work covered by the Contract Documents.

The Contractor shall erect and maintain adequate signs, fencing, barricades, lights or security measures and persons to protect the Work until the Engineer authorizes in writing the removal of signs, fencing, barricades, lights or security measures.

8.20 SAFETY

The Contractor shall take all reasonable precautions for the safety of all employees working on this Contract and all other persons who may be affected by such Work. The Contractor shall designate a responsible member of its organization at the Site whose duty shall be to manage and coordinate the Safety Programs and to prevent accidents of the Contractor and Subcontractor and suppliers.

Except as otherwise stated in the Contract, if the Contractor encounters on the Site material reasonably believed to be Hazardous Material including but not limited to asbestos, lead, or polychlorinated biphenyl (PCB), the Contractor shall immediately stop Work in the area affected and give notice of the condition to the District. Work in the affected area shall not be resumed without written direction by the District.

In order to protect the lives and health of persons performing Work under this Contract, the Contractor shall comply with the Federal Occupational Safety and Health Act of 1970 (OSHA), including all revisions, amendments and regulations issued thereunder, and the provisions of the Washington Industrial Safety Act of 1973 (WISHA), including all revisions, amendments and regulations issued thereunder by the Washington State Department of Labor and Industries. The WISHA regulations shall apply, without limitation, to all excavation, tunneling, trenching and ditching operations. In case of conflict between any such requirements, the more stringent regulation or requirement shall apply. There is no acceptable deviation from these safety requirements, regardless of practice in the construction industry. Any violation of OSHA, WISHA or other safety requirements applicable to the Work may be considered a breach of this Contract.

8.21 UTILITIES

In connection with any underground and utility Work, the Contractor shall strictly comply with Chapter 19.122 of the Revised Code of Washington. Any cost or



scheduling impact resulting from the Contractor's failure to comply with these statutory provisions shall be borne by the Contractor.

Unless specified otherwise by the Contract, Contractor shall plan and execute its Work to prevent outages in existing utilities or disruption of service. Where removal or relocation of known or disclosed utilities or temporary utility connections are necessary to accommodate the Work, such removal, relocation or temporary connections shall be performed at the Contractor's sole expense unless it is specified in the Contract Documents that it will be performed by the District or by others.

The District or utility owner may enter the Site from time to time to make changes as may be necessary for the relocation of utilities or to make necessary connections or repairs. Where the utility owner is identified as being responsible for removing or relocating utilities, the Contractor shall make timely arrangements with the utility owner to schedule such work to accommodate the Work. The Contractor shall also cooperate with and facilitate any necessary access to or on the Site by the forces engaged in such work and shall conduct its operations in such a manner as to avoid delay or hindrance to the work being performed by such other forces.

Contractor shall not commence any excavations until existing utilities have been staked or marked by the utility owner. The District will provide utility locates for District-owned utilities. The Contractor may encounter underground utilities adjacent to their Work operations. It shall be the Contractor's responsibility to protect these utilities from damage. If the Contractor discovers the presence of any unknown/unidentified utilities at the Site, the Contractor shall provide the District oral or written notice promptly (and in no event more than 24 hours after discovery). If any underground utility not identified in the Contract Documents must be relocated to accommodate the Project, the Engineer will either arrange for the relocation of such utility or provide a Change Order to the Contractor to do such work. If the Contractor asserts that the discovery entitles it to a change in Contract Price and/or Time, written notification shall be made in accordance with Section 8.24.

The Contractor may request District approval for changes or rearrangement to any utility for the Contractor's convenience in order to facilitate construction of the Work. The District shall be the sole judge of whether the proposed change or rearrangement is acceptable. The Contractor shall be responsible for any delay or cost resulting from this request.

Loss of time, if any, suffered by the Contractor due to delays in removal or relocation of any utilities by others may be considered in relation to a request by the Contractor for an adjustment to the Contract Time in accordance with Sections 8.23 and 8.26.



Utilities damaged by the Contractor shall be repaired by the Contractor to their original condition at the Contractor's expense. The Contractor shall notify the Engineer of any such damage promptly (and in no event more than 24 hours after the damage occurs) and shall begin repairs immediately and work continuously until the utility is restored to the satisfaction of the Engineer.

8.22 DISTRICT-INITIATED CHANGES IN THE WORK

- (a) The District, without invalidating the Contract, may order extra work or make changes by altering, adding to or deducting from the Work. The District reserves the right to make such alterations in the Plans or in the quantities of Work as may be considered necessary. Such alterations shall be in writing by the District and shall not be considered a waiver of any condition of the Contract nor invalidate any of the provisions thereof.
- (b) All such changes in the Work shall be authorized and directed by Change Order.
- (c) Unless the District in its sole discretion agrees otherwise in writing by way of Change Order, an alteration that only increases or decreases the quantity of bid item units to be installed shall not modify or adjust the unit prices set forth in the Proposal or contained in the Contract Price.
- (d) Subject to the limitation set forth above in (c), any modification to the Contract Price due to such changed Work shall be determined, in order of precedence, in the following methods:
 - 1. By unit or lump sum prices set by the Contract.
 - 2. If method (1) does not apply, by prices mutually agreed upon.
 - 3. If no agreement is reached under method (2), such Work will be paid for under Force Account rules established pursuant to Section 8.25 of these General Conditions. In such cases, the Contractor shall keep and present in such form as the Engineer may direct a correct account of such costs, together with supporting time cards and vouchers. The Engineer shall evaluate and determine the amount due Contractor.
- (e) This Section 8.22 applies only to District-initiated changes in the Work.

8.23 CONTRACTOR REQUESTS FOR CHANGE / CLAIMS

If the Contractor believes it is entitled to any additional compensation or time extension for any reason, the Contractor shall comply with the terms and conditions of this Section 8.23. In general, as described further below, the Contractor must adhere to a three-step process in making any request for additional compensation and/or time extension: (1) a timely written Notice of Intent



(2) a timely and properly documented Request for Change Order and, if such Request is denied (3) a timely and properly documented submission of a Claim.

Step 1: If the Contractor claims that the cost to perform the Work has been increased through any act or omission believed to be the District's responsibility (including without limitation District instructions, Plans, Site conditions or any alleged interference or impact by the District) the Contractor shall give the Engineer written Notice of Intent within five (5) Days after the receipt of any such instructions, or occurrence of any other act, omission or impact, and in any event before proceeding to execute the Work (except in emergency endangering life or property). The Notice of Intent shall describe (1) the date, circumstances, and source of the direction, instruction, interpretation, determination by the District and/or the event or impact to the Project (2) reasonable order of magnitude estimate of the change to the Contract Price (3) reasonable order of magnitude estimate of the time impact to the Contract Time; and (4) Contract provisions and substantive basis to support entitlement. Contractor's failure to provide the Notice of Intent as required by this Section 8.23 will act as a waiver of any right to bring any Claim related to the act, omission or impact in question.

Step 2: Within no more than 14 Days of submitting its Notice of Intent, The Contractor shall provide a detailed Request for Change Order to the Engineer. The Request for a Change Order shall include:

- Specific dollar amount covering all costs associated with the requested Change Order calculated in accordance with the Contract;
- Specific request for time extension (number of days);
- All documentation supporting the Request for a Change Order, including but not limited to all cost records and any schedule analysis.

Contractor's failure to provide the Request for Change Order as required by this Section 8.23 will act as a waiver of any right to bring any Claim related to the act, omission or impact in question.

The District will review each submitted Request for Change Order within thirty (30) Days after receipt and will respond in writing approving or denying the Request.

Step 3: If the Request for Change Order is denied, the Contractor within no more than thirty (30) Days of the denial shall file a written Claim. At a minimum, a fully documented Claim must contain the following information:

- A detailed statement of the Claim providing all necessary details, locations, and items of Work affected;
- The date on which the incident arose that gave rise to the Claim;



- The name of each person employed or associated with the Contractor, Subcontractors, suppliers, and/or the District with knowledge about the event or condition which gave rise to the Claim;
- Copies of documents and a written description of the substance of any oral communications that concern or relate to the Claim;
- The specific provisions of the Contract Documents on which the Claim is based;
- If an adjustment in the Contract Price is sought, the exact amount sought, calculated in accordance with the Contract and accompanied by all records supporting the Claim;
- If an adjustment in the Contract Time is sought, the specific days and dates for which it is sought; the specific reason the Contractor believes an adjustment in the Contract Time should be granted; and the Contractor's analyses of its Schedule, any specific Schedule analysis as required by the Contract Documents, and all updates to demonstrate the reason for the adjustment in Contract Time; and,
- A statement certifying, under penalty of perjury, that after the exercise of reasonable diligence and investigation the Claim is made in good faith, that the supporting cost and pricing data are true and accurate to the best of the Contractor's knowledge and belief, that the Claim is fully supported by the accompanying data, and that the amount requested accurately reflects the adjustment in the Contract Price or Contract Time for which the Contractor believes the District is liable.

Failure to comply with the time requirements set for filing a Claim shall constitute acceptance by the Contractor, on behalf of itself and its Subcontractors and suppliers, of the District's denial of a Request for Change Order. Such acceptance shall be considered complete, full, and final settlement of all costs, damages, and Claims related to or arising from the Request for Change Order.

Any modification to the Contract made on account of any Request for Change Order or Claim shall be determined, in order of precedence, in the following ways:

1. By unit or lump sum prices set by the Contract.
2. If method (1) does not apply, by prices mutually agreed upon.
3. If no agreement is reached under method (2), payment for the Request for Change Order or Claim will be made under Force Account rules established pursuant to Section 8.25 of these General Conditions. In such cases, the Contractor shall keep and present in such form as the Engineer may direct a correct account of such costs, together with supporting time cards and vouchers.

After the Contractor has submitted a fully documented Claim that complies with this provision, the District shall respond, in writing, to the Contractor within thirty



(30) Days from the date of receipt of the fully documented Claim. If the District denies the Claim, the Contractor's sole remedy is as set forth in Section 8.46 (Venue/Limitation).

8.24 DIFFERING SITE CONDITIONS

If the Notice of Intent, Request for Change Order or Claim arises from an alleged Differing Site Condition, the requirements of this Section will apply in addition to those set forth in Section 8.23. In the event this Section imposes requirements, deadlines or rules more stringent than those set forth in Section 8.23, the requirements, deadlines or rules of this Section will govern.

The Contractor shall within 24 hours of discovery notify the Engineer in writing of: (1) pre-existing subsurface or latent physical conditions differing materially from those indicated in the Contract, or (2) pre-existing unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work of the character provided for in the Contract. This 24-hour Notice of Intent is in place of the 5 Day Notice of Intent listed in Section 8.23. Provided Contractor complies with this 24 hour Notice of Intent requirement and wishes to pursue relief, it must then comply with Step 2 and Step 3 set forth in Section 8.23. Contractor shall at all times preserve (and not dispose) the physical conditions or materials constituting the alleged Differing Site Condition and upon request make them available to the District for review and/or inspection.

Any geotechnical reports provided to Contractor shall have the following order of precedence: (1) Geotechnical Baseline Report (GBR) and/or Geotechnical Baselines described in the Specifications; (2) Geotechnical Data Report (GDR); (3) Geotechnical Design Report; (4) other soils reports, borings, test pits or additional investigative data. Baseline statements in the GBR and/or Geotechnical Baselines described in the Specifications shall take absolute precedence over any data in the GDR or elsewhere (or any inference or interpolation from such data) even if the baseline statements exceed the physical conditions identified in the data.

8.25 FORCE ACCOUNT

- A. Whenever, under the terms of the Contract, labor, Materials, or Equipment are to be paid for on a Force Account basis, the amount of such payment shall be determined as follows:
1. Labor: For all labor, the Contractor shall be paid an amount equal to the sum of the following:
 - a. Wage Rate: The wage rate for all labor used shall include and be restricted to the actual current certified basic wages earned, plus fringe benefits made the obligation of the



Contractor by a collective bargaining agreement or other employment agreement, plus benefits paid on account of such labor by the Contractor pursuant to the:

- 1) Federal Insurance Compensation Act (FICA);
 - 2) Federal Unemployment Tax Act (FUTA); and
 - 3) State Unemployment Compensation Act (SUCA).
 - 4) Only bona fide employee fringe benefits that accrue to the direct benefit of the employee (such as pension and annuity, health and welfare, vacation apprenticeship, and training funds) shall be included in the calculation of the weighted wage rate. Other fringe benefits that are not a direct benefit of the employee (such as union promotion funds) shall be paid as part of the markups allowed on the Work.
- b. Industrial Insurance and Medical Aid Premiums: State of Washington Industrial Insurance and Medical Aid premiums that become an obligation of the Contractor are chargeable to the labor performed on the Work to be paid for on a Force Account basis.
- c. The Force Account Work may be performed and paid on an overtime basis only if specifically directed or authorized by the District in advance of the Work being performed. The Contractor may request that the Work be done on overtime if it supports the request with specific reasons for incurring the additional cost of overtime.

2. Materials:

- a. For all Materials furnished by the Contractor for the Work, payment shall be made in the amount of the actual invoice cost for such Materials, including actual freight and express charges and applicable taxes paid by the Contractor and not already addressed for payment herein, plus any applicable sales tax. Before Work is started, the District may require the Contractor to obtain multiple quotations for the Materials to be utilized and select the vendor with prices and terms most advantageous to the District.
- b. The Contractor shall furnish to the District valid copies of supplier invoices, including freight and express bills. As to such Materials as may be furnished from the Contractor's own



inventory for which an invoice is not available, the Contractor shall furnish current cost quote to determine the fair market value of the Materials.

- c. If the District determines that the Contractor's cost of such furnished Materials is excessive or if the Contractor does not furnish documentary evidence of its costs, the District reserves the right to establish the cost of all or part of such Materials at the lowest current wholesale prices less all applicable discounts and exemptions.
- d. The District reserves the right to furnish such Materials to the Contractor as it deems advisable, and the Contractor shall have no claim for any costs, overhead, or profit on such furnished Materials.

3. Equipment:

- a. Rental Equipment: For equipment rented by the Contractor, payment shall be made (subject to the reduction noted below) at the lesser of (i) the invoice rate charged to Contractor or (ii) the rates stated in the current Rental Rate Bluebook in effect at the time such tools or equipment were used. The rates stated in the current Rental Rate Bluebook are the maximum rates allowable for equipment of modern design and in good working condition, and include and are full compensation for overhead, profit, bonds and for furnishing all fuel, oil, lubrication, repairs, maintenance, insurance and all other costs incidental to the furnishing of such tools and equipment, except for the labor to operate the same. The stated compensation for use of tools or equipment not of modern design or not in good working conditions shall be reasonably reduced determined by the District. Rented Rates for specialty equipment such as tunneling equipment not found in the Blue Book shall be established by District audit using standard accounting procedures based on Actual Cost as defined below. Such rates must be approved by the District prior to use of the equipment on the Force Account Work.
- b. Owned Equipment: For equipment owned by the Contractor, payment shall be made on the basis of Actual Cost. The term Actual Cost means the ownership and operating cost of the equipment as determined by the District based on records made available by the Contractor. The District in determining Actual Cost may consider the equipment's acquisition cost, the equipment's useful life, any indirect costs associated with



ownership of the equipment, depreciation and other commercially reasonable factors. It is the responsibility of the Contractor to provide cost records to the District upon request to assist with determining the Actual Cost for the equipment. If the Contractor did not keep and maintain such cost records or fails to comply with the document request made by the District, the District may at its option make a reasonable determination of the Actual Cost. If the Contractor disagrees with this determination, it must file a written Notice of Intent and pursue a Request for Change Order as set forth in Section 8.23.

- c. Payment for equipment during any standby time or shutdown caused by the District shall be paid at: (i) 25% of Actual Cost (for owned equipment) or (ii) 100% of the applicable rental rate (for rental equipment) for a period not to exceed ten (10) Days.
4. Subcontractors:
 - a. When Work is performed on a Force Account basis by Subcontractors, the Subcontractor will be allowed the total cost computed for labor, Materials, and Equipment as stated above plus markups as indicated below.
 5. Markups:
 - a. The Contractor or Subcontractor that performs the Work shall be reimbursed a markup in an amount equal to twenty percent (20%) of the sum of the allowable Force Account cost.
 - b. For Work performed by a Subcontractor, the Contractor shall be reimbursed an amount equal to six percent (6%) of the allowable Force Account costs paid to Subcontractor.
 - c. In no event will the District pay more than a cumulative markup of 26% regardless of the number of sub-tier Subcontractors.
 - d. The markups listed above constitute full payment for all indirect costs, including B&O tax, overhead, bond, small tools, profit, fee, supervision, safety, insurance, project management, vehicles and incidentals.
 6. Sales Tax. Sales tax shall be paid as otherwise provided in the Contract Documents.



7. The payments and markups provided above shall be full payment for all Work done on a Force Account basis and shall cover all expenses of every nature, kind, and description, including without limitation costs due to delay, impact, acceleration or inefficiency.
- B. No compensation for Work performed on a Force Account basis shall be paid unless the District provided prior written direction to the Contractor to perform the Work on such a basis. No Work shall be considered to be Force Account Work, which can be measured and paid for at a unit price established in the Contract.
- C. The amount of Work to be paid for on a Force Account basis shall be documented in writing on a daily basis by the Contractor and the District. The Force Account Work shall be tracked on the District Force Account Form provided by the District. The Contractor shall complete the Force Account Form (including manpower, equipment, materials, change order number or bid item number, project number, description) on a daily basis and submit it within 24 hours to the District for verification.
- D. The Contractor shall give notice to the District of Contractor's intent to commence the Force Account Work prior to starting the Work. Such notice shall be given on a daily basis to alert the District of the Work being performed for which the Contractor will seek the District's verification or certification.
- E. The Contractor shall give the District notice when 80% of the amount authorized to be spent on an issue has been expended or as soon as the Contractor is aware that there is not enough funds authorized to complete the work. Application for payment for Work done on a Force Account basis must be submitted no later than thirty (30) Days following the performance of the Force Account work. The Contractor shall submit a detailed spreadsheet (in electronic form) of the Force Account payment requested so that the District can quickly check the detailed math calculations to verify the total amount being requested.

8.26 DELAYS AND EXTENSION OF TIME

- (a) If the Contractor seeks an extension of the Contract Time or additional compensation due to an allegedly compensable impact to the Contract Time, its sole remedy is to comply with the Notice of Intent / Request for Change Order / Claim process identified in Section 8.23. The remainder of this Section 8.26 describes the general rules applicable to any timely-filed Notice of Intent / Request for Change Order / Claim related to Contract Time.
- (b) Non-Excusable and Non-Compensable Delays. Delays in the prosecution of the Work that could have been avoided by the exercise of due care,



coordination and diligence on the part of the Contractor, its Subcontractors or its suppliers at any tier are neither excusable nor compensable under the Contract. No extension of Contract Time or increase in the Contract Price shall be allowed for any claimed delay that is caused by or results from the breach, fault, negligence, or collusion of the Contractor, or its Subcontractors, sub-Subcontractors, or suppliers.

(c) Excusable and Non-compensable Delays. The Contract Time may be extended without compensation by the District for a period equivalent to the time that the Engineer determines that the Contractor was delayed in the Work by one or more of the following causes, beyond the control of the District and the Contractor, occurring during the performance of the Work:

1. Fire or other casualty for which the Contractor is not at fault or otherwise responsible;
2. Riot, war, or civil disorder;
3. Unusual and severe weather
4. General industry strikes or labor disputes beyond the reasonable control of Contractor,
5. Unreasonable delay in issuance of a permit by the agency having jurisdiction, and
6. Delay to the Work resulting from causes beyond the control of Contractor and District and that could not have been avoided by Contractor with the exercise of coordination, foresight and diligence.

Such non-compensable extensions of Contract Time will be allowed only to the extent that Substantial Completion of the Work is unreasonably delayed through no fault of the Contractor, which must in all cases be substantiated by impact to the Work on the Schedule. Any extension of the Contract Time by the District will be set forth in a Change Order, which shall specify the Days by which the Contract Time is to be increased.

(d) Excusable and Compensable Delays. The Contract Time may be extended and the Contract Price increased in the event that:

1. The Work was delayed by reason of changes made by the District or by any unreasonable act or omission of the District,
2. The Contractor was not concurrently responsible for the delay in the Work,
3. The Contractor has suffered actual losses as a result of the delay in the Work,



4. The delay in the Work could not have been mitigated despite the Contractor taking reasonable work-around actions, and
5. The delay in the Work was not within the contemplation of the Contract.

In that event, the Contract Time will be extended for a period equivalent to the time that the Engineer determines that the Contractor was delayed in the Work and the Contract Price will be increased to compensate the Contractor for its loss from such delay and associated disruption. Any extension of the Contract Time and increase in the Contract Price by the District will be set forth in a Change Order, which shall specify the Days by which the Contract Time is to be increased and the amount by which the Contract Price is to be increased.

8.27 COMPLETION AND/OR CORRECTION OF WORK

- (a) If the Contractor should neglect to prosecute the Work properly and/or fail to perform any provision of this Contract, the District, after five (5) Days' written notice to the Contractor, may, without prejudice to any other remedy it may have, make good such deficiencies and deduct the cost thereof from payments then or thereafter due the Contractor.
- (b) The Contractor shall promptly remove from the construction Site all Materials and/or Equipment rejected by the Engineer as failing to conform to the Contract, whether incorporated in the Work or not; and the Contractor shall promptly replace and re-execute its own Work in accordance with the intent of the Contract and without expense to the District and shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement. If the Contractor does not remove such rejected Work and Materials and/or Equipment and commence re-execution of the Work within five (5) Days of notice from the Engineer, the District may correct the same as otherwise provided herein.
- (c) If the Contractor does not remove such rejected Work and Materials and/or Equipment within the period herein above described, the District may remove and store any such Materials and/or Equipment at the expense of the Contractor. If the Contractor does not pay the cost of such removal within ten (10) Days from the notice to Contractor of the fact of such removal, the District may, upon an additional ten (10) Days' written notice, sell such Materials and/or Equipment at public or private sale, and deduct all costs and expenses incurred, including costs of sale, accounting to the Contractor for the net proceeds remaining, and District may bid at any such sale. Contractor shall be liable to District for the amount of deficiency remaining between the costs incurred and the proceeds of sale. District may deduct the costs of such removal, storage and sale and/or remaining deficiency from any funds otherwise due the Contractor.



8.28 DEFECTS ARISING IN TWO YEARS AND REMEDIES

- (a) The Contractor shall be responsible for correcting all defects in workmanship and Materials and/or Equipment within two (2) years after Acceptance. When corrections of defects are made, Contractor shall be responsible for correcting all defects in workmanship and/or Materials and Equipment in the corrected Work for two years after proper completion of the correction. The Contractor shall start work to remedy such defects within seven (7) Days of mailing notice of discovery thereof by District and shall complete such work within a reasonable time. In emergencies, where damage may result from delay or where loss of service may result, such corrections may be made by the District, in which case the cost shall be borne by the Contractor. In the event the Contractor does not accomplish corrections at the time specified, the Work will be otherwise accomplished and the cost of same shall be paid by the Contractor.
- (b) The Contractor shall be liable for any costs, losses, expenses, or damages, including consequential damages suffered by the District resulting from defects in the Work including, but not limited to, cost of Materials and labor extended by District in making emergency repairs and cost of engineering, inspection and supervision by District or Engineer. The Contractor shall hold the District harmless from any and all claims which may be made against the District as a result of any defective Work and the Contractor shall defend any such claims at its own expense.

8.29 SUSPENSION OF WORK

- (a) The District may order the Contractor, in writing, to suspend all or any part of the Work of this Contract for the period of time that the District determines appropriate for the convenience of the District. The Contractor shall not suspend the Work without written direction from the District specifically authorizing the suspension of Work.
- (b) Upon receipt of a written notice suspending the Work, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize costs attributable to such suspension. The District may require the Contractor to furnish temporary roads, patches, safety barricades, restorative work, or other measures to protect the Work, the Site, property adjacent to the Site, and public safety. Within a period up to 120 Days after the suspension notice is received by the Contractor, or within any extension of that period which the District requires, the District shall either:
1. Cancel the written notice suspending the Work; or
 2. Terminate the Work for either Default or Convenience as provided in Sections 8.30 and 8.31.



- (c) If a written notice suspending the Work is canceled or the period of the Suspension or any extension thereof expires, the Contractor shall resume Work as required by the District.
- (d) If the performance of all or any part of the Work is, for an unreasonable period of time, suspended by the written direction of the District, and if the cause of the suspension is not the fault, breach or negligence of the Contractor or those for whom Contractor is responsible, the Contractor may be entitled to an adjustment in the Contract Price and/or Contract Time for increases in the time or cost of performance directly attributable to such unreasonably long suspension and provided that the Contractor sufficiently documents all costs and time impacts attributable to the suspension. No adjustments to Contract Price and/or Contract Time shall be allowed unless the Contractor can demonstrate that the unreasonable period of suspension caused by the District impacted the Work and delayed the Contractor from completing the Work within the Contract Time. The Contractor shall comply with the requirements of Sections 8.23 and 8.26 in seeking an adjustment. Any sums paid to Contractor on account of suspension shall be determined in accordance with the order of precedence described in Section 8.23. Failure to comply with these requirements shall constitute a waiver of Contractor's rights to any adjustment in Contract Time and/or Contract Price.
- (e) No adjustment shall be made under this provision for any suspension to the extent that (1) Contractor's performance would have been suspended, delayed, or interrupted as a result of actions, omissions, fault or negligence caused, in whole or in part, by the Contractor or any of its Subcontractors and suppliers, (2) Contractor failed to diligently pursue the Work before the suspension, (3) the District suspended the Work due to Contractor's failure to comply with the Contract or the Engineer's orders, or (4) an equitable adjustment is provided for or excluded under any other provision of the Contract.
- (f) When ordered by the Engineer to suspend or resume Work, the Contractor shall do so immediately.
- (g) Before and during any suspension the Contractor shall protect the Work from damage or deterioration. Suspension shall not relieve the Contractor from anything the Contract requires unless this section states otherwise.

8.30 DISTRICT'S RIGHT TO TERMINATE CONTRACT FOR DEFAULT

- (a) The District may terminate the Contract and take possession of the premises and of all Materials and Equipment thereon and finish the Work by whatever methods it may deem expedient, upon the occurrence of any one or more of the events hereafter specified, and receipt of the certificate by the Engineer that sufficient cause exists to justify such action:



- If the Contractor is insolvent, files a petition for bankruptcy protections, is adjudged bankrupt, makes a general assignment for the benefit of its creditors, or a receiver is appointed on account of its insolvency.
- If the Contractor fails to supply a sufficient number of properly skilled workmen or proper Materials or Equipment for completion of the Work.
- If the Contractor fails to prosecute the Work or any portion thereof with such diligence as will ensure Substantial Completion within the original Contract Time and any extensions of time which may have been granted to the Contractor by Change Order or otherwise.
- If the Contractor fails to prosecute the Work or any portion thereof with such diligence as will ensure Physical Completion of the Work in a timely manner.
- If the Contractor fails in a material way to repair, replace, or correct Work not in conformance with the Contract.
- If the Contractor fails to make prompt payment to its employees or Subcontractors and suppliers.
- If the Contractor disregards laws, ordinances, rules, codes, regulations, orders or similar requirements of any public entity having jurisdiction over the Contractor, the Work, or the Site.
- If Contractor fails to comply with any Contract safety requirement.
- If the Contractor otherwise materially breaches any provisions or requirements of the Contract or persistently disregards instructions of Engineer.

District shall give Contractor five (5) Days' written notice to cure the default and, if not cured to the satisfaction of District as certified by Engineer, the District may, upon three (3) Days' written notice, elect to so terminate. Any such termination shall be without prejudice to any other right or remedy which District may have against Contractor.

- (b) If Contractor fails to cure the default to the District's satisfaction within the five (5) Day cure period, or if the Contractor abandons the Work undertaken under the Contract, District may, at its option, upon ten (10) Days' written notice to the Surety and without any written notice to Contractor, transfer the employment of said Work from Contractor to Surety. Upon receipt of such notice, the Surety shall enter upon the premises and take possession of all Materials, Equipment, tools and appliances thereon for the purpose of completing the Work included under this Contract and employ, by contract or otherwise, any person or persons to finish the Work and provide the Materials and Equipment therefore, without termination of the continuing full force and effect of the Contract. In case of transfer of such employment to the Surety, the Surety shall be paid in its own name on estimates covering the Work subsequently performed under the terms of the Contract and



according to the terms hereof, without any right of Contractor to make any claim for the same or any part thereof.

- (c) In the event that the Contract is terminated for default by the District, Contractor shall not be entitled to receive any further balance of the amount to be paid under this Contract until the Work shall have been fully finished. At such time, if the unpaid balance of the amount to be paid under this Contract exceeds the expense incurred by District in finishing the Work, and all damages sustained or which may be sustained by District by reason of such refusal, neglect, failure of discontinuance of employment, such excess shall be paid by District to Contractor. If such expense and damages shall exceed the unpaid balance, Contractor and its Surety and each thereof shall be jointly and severally liable therefore to District and shall pay the difference to District. Such expense and damage shall include all reasonable legal costs incurred by District in the employment of attorneys to protect the rights and interests of District under the Contract.

8.31 DISTRICT'S RIGHT TO TERMINATE CONTRACT FOR CONVENIENCE

- (a) Upon written notice to the Contractor, the District may terminate the Work, or any part of it, without prejudice to any right or remedy of the District inclusive of all audit rights in the Contract, for the convenience of the District.
- (b) If the District terminates the Work or any portion thereof for convenience, Contractor shall be entitled to be paid, at applicable Contract rates and prices, for Adjusted Contract Work executed in conformance with the Contract and completed prior to the effective date of the termination.
- (c) Termination for Convenience shall not enlarge, expand, modify, alter or in any way subsume or convert the rights or remedies (if any) of Contractor with respect to any Claim, Request for Change Order, Notice of Intent or other request for any revision to the Contract Price or Contract Time asserted or accrued at the time of the termination (collectively, "Pending Requests"). Without limiting the foregoing, the termination for convenience shall not have the effect of converting the Pending Requests into no-fault or assumed liabilities of the District. Following any Termination for Convenience, Contractor's rights or remedies (if any) to any extra compensation, change in the Contract Price or additional Contract Time for any Pending Requests shall continue to be subject to and governed by the same Contract provisions, legal rules and processes, defenses and burdens of proof that would apply but for the termination.
- (d) Except as provided for above in Section 8.31(b) or (c), the Contractor shall not be entitled to any other costs or damages whatsoever (including without limitation profit or overhead on the terminated Work). The total sum payable



upon termination shall also not exceed the Contract Price reduced by prior payments.

- (e) If it appears that due to any cause or reason the Contractor would have incurred a loss on the entire Contract had it been completed, the District shall not reimburse Contractor for any indirect costs for the Adjusted Contract Work completed and shall reduce the settlement to reflect the indicated rate of loss.
- (f) If the payments made by the District prior to the effective date of the termination exceed the reasonable direct cost of the Adjusted Contract Work completed as of the effective date of the termination (as in, for example, a mobilization payment that exceeds direct mobilization costs or other similar front-loaded payments), the District shall at its option be entitled to a credit for the overpayment. The Contractor shall cooperate with any audit the District elects to conduct pursuant to the terms of the Contract.
- (g) The rights and remedies of the District in this provision are in addition to any other rights and remedies provided by law or under this Contract, inclusive specifically of all audit rights.

8.32 CONTRACTOR'S OBLIGATIONS DURING TERMINATION

Unless the District directs otherwise, after receipt of a written notice of Termination for Default or Termination for Convenience, Contractor shall promptly:

- (a) Stop performing Work on the date and as specified in the notice of termination;
- (b) Place no further orders or subcontracts for Materials, Equipment, services or facilities, except as may be necessary for completion of such portion of the Work not terminated;
- (c) Cancel all orders and subcontracts, upon terms acceptable to the District, to the extent that they relate to the performance of Work terminated;
- (d) Assign as specifically requested by the District all of the rights, title, and interest of Contractor in all orders and subcontracts;
- (e) Take such action as may be necessary or as directed by the District to preserve and protect the Site and any other property related to this Project in the possession of Contractor in which the District has an interest;
- (f) Continue performance of the Work only to the extent not terminated;



(g) If notified to do so by the District, promptly remove any part or all of its Equipment, Materials, and supplies from the Site; and,

(h) Take any other steps required by the District with respect to the Project.

If Contractor fails to remove its Equipment, Materials, or supplies within three (3) Days of District's notice to do so, District shall have the right to remove such Equipment, Materials, and supplies at the expense of Contractor, deducting the cost thereof from any funds otherwise due Contractor.

8.33 USE OF COMPLETED PORTION OF WORK

District shall have the right to take possession of and use any completed or partially completed portions of the Work, notwithstanding that the time may not have expired for completing the entire Work. Such taking possession and use shall not be deemed to be completion of the Contract in respect to such Work nor shall the same be deemed to be Acceptance of the Work.

8.34 APPLICATION FOR PAYMENT

On or about the first business day of each month, the Contractor shall submit to the District an Application for Payment. Each application shall be on a form acceptable to the District and designated as an "Application for Payment." The Contractor shall include with each Application for Payment:

1. Current schedule of values reflecting the Work done since the last Application for Payment and the cumulative Work completed to date;
2. Project Schedule and the most current updates; and,
3. Affidavits signed by all Subcontractors performing Work as of the last Application for Payment, stating that each of them has been paid, less earned retainage, as their interests appeared in the last Application For Payment.

The Contractor is not entitled to payment for any Work unless the Application for Payment includes all required documentation. The District reserves the right to withhold payment pursuant to Section 8.38 if it is subsequently determined that all required documentation was not provided by the Contractor or any of the documentation provided by the Contractor was inaccurate or otherwise objectionable. At the District's option, no payments will be made after the date of expiration of the Contract Time, as established in the Contract, until final payment.

The Application for Payment shall correlate the amount requested with the schedule of values and with the state of completion of the Work, as measured by the current Project Schedule. In addition to Work performed by the Contractor,



Applications for Payment may include the cost of Materials suitably stored on the Site in accordance with Section 8.35.

The District shall comply with RCW 39.76, as amended, and promptly review each Application for Payment and identify in writing any cause for disapproval within eight (8) working days. In addition to withholding payment for unsatisfactory performance or failure to comply with Contract requirements, if the Contractor's Application for Payment fails to recognize any back-charges, off-sets, credits, change orders, or deductions in payment made in accordance with Section 8.35, the District shall have the right to revise or disapprove Contractor's Application For Payment because the Application For Payment is not considered a properly completed invoice.

8.35 PROGRESS PAYMENTS

Progress payments will be made no more often than monthly following Contractor's Application for Payment. Payment shall be based upon the actual quantities of Work performed as verified and agreed by the Engineer according to the Contract Documents. Payment shall be based upon invoices approved by the Engineer. Progress payments will be made within forty-five (45) Days of the District's receipt of the properly prepared invoice (Application for Payment). Monthly progress payments will be made to the Contractor during the working period but not after the Substantial Completion date. Five per cent (5%) of the amount of the estimated progress payment will be retained by the District as provided in Chapter 60.28 RCW. The statutory retained percentage shall be managed by the District as specified by the Contractor in the Proposal form of the Bid Documents.

The Contractor is required to make payment to all Subcontractors and suppliers for all Work included within the progress payment within ten (10) Days from the receipt of the progress payment. Furthermore, the Contractor shall require all subcontracts issued under this contract to all Subcontractors and suppliers at all tiers to also make all due payments within ten (10) Days of their receipt of payment. The Contractor must justify to the District in writing any intent to withhold payment of monies due to any Subcontractor or supplier.

The cost of Materials, properly stored, protected and insured at the Site of the Work, will be paid on monthly estimates only when provided for in the Special Provisions, and then only for the specific Materials listed therein for partial payment. In preparing the monthly estimates, advancement will be made therein for ninety per cent (90%) of the cost of such Materials, as evidenced by invoices to Contractor. Advances will not be made for any item of Material amounting to less than five hundred dollars (\$500.00). All Materials must conform to the requirements of the Specifications. However, advancement for Materials will not constitute acceptance of same, and any faulty Materials will be condemned although advancement may have been made for same in the estimates.



Deductions at the same rates and equal in amount to the advancements, will be made on the estimates as the Materials are used. All Materials for which costs are allowed under this subparagraph must be substantiated by written documentation from the Material supplier that the Material has been paid for.

8.36 FINAL PAYMENT

The District will make final payment, excluding held retention, to the Contractor following (1) Physical Completion and (2) final resolution by settlement, mediation or litigation of all Requests for Change Orders or Claims. Final payment shall include the entire sum found to be due hereunder after deducting therefrom such amounts as the terms of the Contract permit. Prior estimates and payments, including those relating to unit price Work, extra Work or Work omitted, shall be subject to review and correction by the final payment. Final payment will be made only for Materials actually incorporated in the Work; and, all Materials remaining for which progress payments have been made shall revert to the Contractor, unless otherwise agreed, and progress payments made for these items shall be deducted from the final payment for the Work.

By accepting final payment, the Contractor shall be deemed thereby to have released the District from all claims of Contractor and all liability to the Contractor for things done or furnished in connection with the Work and for every act and neglect of the District and others relating to or arising out of the Work, other than release and held retention. Final payment by the District shall not release the Contractor or its Surety from any obligation under the Contract or under the performance and payment bonds or under any warranty obligations.

Neither the final payment nor any part of the retained percentage shall become due until Contractor, if requested, shall deliver to District a complete release of all liens arising out of this Contract, or receipts in full in lieu thereof, and, if required in either case, an affidavit that so far as it has knowledge or information, the release and receipts include all labor and Material for which a lien could be filed; but Contractor may, if any Subcontractor refuses to furnish a release or receipt in full, furnish a bond satisfactory to Engineer to indemnify District against any lien. If any lien remains unsatisfied after all payments are made, Contractor shall reimburse to District all moneys that the latter may be compelled to pay in discharging such lien, including all costs and reasonable engineer's and attorney's fees.

8.37 ACCEPTANCE AND RELEASE OF RETAINAGE

Following issuance of the Notice of Physical Completion and the completion of all closeout administrative requirements, the District will formally accept the Project. Once the District determines that the Contractor has fulfilled these requirements, the Engineer will issue a formal Notice of Acceptance.

Promptly following Acceptance, the District will prepare the Notice of Completion of Public Works Contract and submit it to the relevant Washington State agencies.



Release of the retainage will be made no sooner than sixty (60) Days after issuing the Notice of Completion of a Public Works Contract provided the following conditions are met:

1. On Contracts totaling more than \$35,000, a release has been obtained from the Washington State Department of Revenue (RCW 60.28.051);
2. Receipt of a certificate of Payment of Contributions Penalties and Interest on Public Works Contract from the Washington State Employment Security Department;
3. Receipt of a certificate from Washington State Department of Labor and Industries showing the Contractor is current with payments of industrial insurance and medical aid premiums;
4. All claims, as provided by law, filed against the retainage have been resolved. In the event claims are filed and provided the conditions of 1 through 3 above are met, the Contractor will be paid such retained percentage less an amount sufficient to pay any such claims together with a sum determined by the District sufficient to pay the cost of foreclosing on claims and to cover attorney's fees.

It is the responsibility and a condition of this Contract that Contractor promptly notifies all Subcontractors and suppliers of the commencement of the period and of the final day for submitting any liens. As a further condition of this Contract the Contractor is required to place within all subcontracts a clause that states that this shall be done. The Contractor shall by letter inform the District of the compliance with this provision. Failure of the Contractor to comply with this provision may be used by the District as a basis to withhold retainage to ensure payment to uninformed Subcontractors. Failure to comply will also be made a matter of record for future determinations of Bidder responsibility.

8.38 DISTRICT'S RIGHT TO WITHHOLD PAYMENTS

In addition to moneys retained pursuant to RCW 60.28 and without waiver of any other available remedies, the District at its sole option has the right to recapture, withhold, nullify, or back-charge, in whole or in part, any payments due to Contractor or payments made to the Contractor on the following grounds:

1. The Work for which the Contractor is claiming payment was not performed in accordance with the Contract;
2. The Contractor's pay request does not contain the required documentation or is otherwise not in conformance with the requirements of the Contract;
3. There is a good faith dispute over all or a portion of the amount due, in accordance with 39.04.250 RCW;



4. Failure of the Contractor to make payments owed to Subcontractors, or for labor, Materials, or Equipment;
5. Failure of the Contractor to submit Schedule(s), schedule(s) of value or update any schedules as required by the Contract;
6. Failure to prosecute progress of the Work in a timely manner or failure to take necessary steps to regain time or deliver the Work in the prescribed Contract Time;
7. A reasonable doubt that the Contract can be completed for the balance then unpaid;
8. Cost or liability that may occur to the District as the result of the Contractor's or Subcontractor's acts, omissions, fault, or negligence;
9. Failure of the Contractor to repair damaged materials, equipment, property, or Work;
10. Imposition of any liquidated or other delay damages under the Contract;
11. Payments made by mistake; or
12. Payments made erroneously and/or in excess of the sum actually due under the Contract.

The withholding, nullification, or back-charge of any payment(s) by the District shall in no way relieve the Contractor of any of its obligations under this Contract. In the event the District withholds all or a part of a payment for deficiencies in either performance, or in a payment request, the District will notify the Contractor in accordance with RCW 39.76. The Contractor shall have the right to correct all deficiencies that are the basis for the withholding and resubmit the pay request at any time for reconsideration.

8.39 HOLD HARMLESS AGREEMENT

The Contractor shall protect, defend, indemnify and hold harmless the District, its officers, officials, separate contractors, employees, agents, and successors and assigns, (collectively "the Indemnified Parties") from any and all liability, claims, demands, suits, penalties, losses, damages, judgments, or costs of any kind whatsoever (hereinafter "claims"), arising out of or in any way, whether direct, indirect or consequential (including, but not limited to, attorneys' and consultants' fees and other expenses of litigation or arbitration) resulting from the Contractor's and/or Subcontractor's and supplier's of all tiers acts or omissions, performance or failure to perform this Contract, to the maximum extent permitted by law or as defined by RCW 4.24.115, now enacted or as hereinafter amended; provided, however, that if the provisions of RCW 4.24.115 apply to the Work and any injuries to persons or property arising out of performance of this Contract are caused by or result from the concurrent negligence of the Contractor or its Subcontractors,



agents or employees, and an Indemnified Party, the indemnification applies only to the extent of the negligence of the Contractor and its Subcontractors, agents or employees. This Paragraph shall not be construed so as to require the Contractor to defend, indemnify, or hold harmless the District from such claims, damages, losses or expenses caused by or resulting from the sole negligence of the District or its agents.

The Contractor specifically assumes potential liability for actions brought by the Contractor's own employees or former employees against any Indemnified Party, and for that purpose the Contractor specifically waives all immunity and limitations on liability under the workers compensation act, RCW Title 51, or any industrial insurance act, disability benefit act or other employee benefit act of any jurisdiction that would otherwise be applicable in the case of such claim. The Contractor recognizes that this waiver was specifically entered into and was the subject of mutual negotiation. Provided, however, the Contractor's waiver of immunity by the provisions of this paragraph extends only to claims against the Contractor by District, and does not include, or extend to, any claims by the Contractor's employee directly against the Contractor.

The District may, in its sole discretion, (1) withhold amounts sufficient to pay the amount of any claim for injury, and/or (2) pay any claim for injury of which the District may have knowledge, regardless of the formalities of notice of such claim, arising out of the performance of this Contract. Any amount withheld will be held until the Contractor secures a written release from the claimant, obtains a court decision that such claim is without merit, or satisfies any judgment on such claim. In addition, the Contractor shall reimburse and otherwise be liable for claims costs incurred by the District, including, without limitation, attorneys' fees and costs and costs for claims adjusting services, engineering, and administration.

In the event the District incurs any judgment, award, and/or costs arising therefrom, including attorneys' fees, to enforce the provisions of this article, all such fees, expenses, and costs shall be recoverable from the Contractor.

The foregoing indemnities and duties to defend shall survive the termination of this Contract and final payment hereunder, and are in addition to any other rights or remedies which District and/or any of the Indemnified Parties may have by law or under this Contract.

8.40 PERFORMANCE AND PAYMENT BOND

The Contractor shall furnish a surety bond in compliance with RCW 39.08 in the full amount of the Contract Price which shall guarantee the faithful performance of the Contract and the payment of all labor, mechanics, Subcontractors and Material suppliers. This bond shall remain in force until all obligations of the Contract are extinguished or until the expiration of all applicable statutes of repose or limitation, whichever is later. Without limiting the foregoing, this bond shall cover, for a period of two (2) years after Physical Completion, all faulty workmanship and Materials or



items of Work warranted by Contractor. This bond shall be furnished by a corporate surety company rated A-VII or higher by A. M. Best, authorized to do business in the State of Washington, acceptable to the District, and subject to the approval of the District's attorney as to form.

8.41 ASSIGNMENT AND SUBCONTRACTING

- (a) Contractor shall not assign the Contract in whole or in part without the written consent of District, nor shall Contractor assign any moneys due or to become due to him hereunder without the prior written consent of District.
- (b) Contractor agrees that it is fully responsible to District for the acts or omissions of Subcontractors and persons either directly or indirectly employed by Subcontractors, as well as for the acts and omissions of persons directly employed by Contractor. District's consent to subcontracting parts of the Work shall in no way release Contractor from responsibility for performance of the Work. Contractor will be held, in all aspects, accountable for subcontracted Work as if no consent had been given. Contractor shall be required to give its personal attention to the Work that is subcontracted. Nothing contained in the Contract Documents shall create any contractual relation between any Subcontractor and District.

8.42 SEPARATE CONTRACT - INTERFERENCE WITH OTHER CONTRACTORS

- (a) District reserves the right to perform work with its own forces or to let other contracts for work under similar general conditions in connection with this Project, of which the work awarded to one or more contractors under separate contracts is a part. Contractor shall afford District and other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their respective work and shall properly connect and coordinate its Work with theirs.
- (b) If the performance of any contract for the Project is likely to be interfered with by the simultaneous execution of some other contract or contracts, Engineer shall decide which contractor shall cease work temporarily and which contractor shall continue or whether the work under the contractor can be coordinated so that the contractors may proceed simultaneously. District shall not be responsible for any damages suffered or extra costs incurred by Contractor resulting directly or indirectly from the award, performance, or attempted performance of any other contract or contracts on the Project or caused by any decision or omission of Engineer respecting the order of precedence in the performance of the contractors other than for an extension of Contract Time.



8.43 CLEANUP

- (a) During performance of the Work, Contractor shall frequently clean up all refuse, rubbish, scrap material and debris caused by its operations. The Site of the Work shall present a neat, orderly and workmanlike appearance at all times.
- (b) Upon completion of the Work, Contractor shall remove all rubbish, scrap material, tools, scaffolding and surplus Materials and Equipment used in and about the Work. Before the Contract shall be considered complete and prior to final payment, Contractor shall remove all surplus Materials and Equipment, falseworks, temporary structures, including foundations thereof, plants of any description, and debris of every nature, resulting from its operations, shall clean out all ditches that may have been filled during the Work, replace damaged surfacing, and put the Site in a neat, orderly condition and, in respect to structures, shall clean all windows and leave buildings broom clean.

8.44 PROPERTY RESTORATION RELEASE

The Contractor shall obtain a written release from each property owner upon whose property Work has been performed or Materials stored. A sample form of such release is included in the Special Provisions section.

8.45 PREVENTION OF ENVIRONMENTAL POLLUTION

The Contractor shall comply with all Federal, State and local statutes, ordinances and regulations dealing with the prevention of environmental pollution and preservation of public human resources that affect or are affected by this Project including, but not limited to, the State Environmental Policy Act of 1971, the National Environmental Policy Act of 1969, King County Council Ordinance No. 1700, King County Council Motion 1335, and any current amendments thereto which are hereby incorporated into the Contract as if written herein in full. All costs for compliance shall be included in the unit or lump sum prices bid for the several items of Work as indicated in the Proposal.

8.46 VENUE/LIMITATION

The exclusive venue for any litigation arising from or relating to this Contract or the Project is King County Superior Court, Seattle, Washington. This Contract and all provisions hereof shall be interpreted in accordance with the laws of the State of Washington.

No legal action against the District may be filed on account of a Claim or other liability arising out of or related to this Contract unless:

1. The requirements of Sections 8.23, 8.24, and 8.26 have been strictly complied with;



2. The procedures of Sections 8.23 and 8.24 have been exhausted; and,
3. The lawsuit is filed in the exclusive venue specified above and served on the District within 180 Days of the date of Substantial Completion.

The Contractor's failure to strictly comply with all requirements of this Section shall be a complete bar to any lawsuit.

APPENDIX A

QUALITY CONTROLS CORPORATION



5015 208th St. SW, Suite 1-B
Phone (425) 778-8280

Lynnwood, Washington 98036
www.qualitycontrolscorp.com

Price and Scope Letter

October 5, 2020 Quote Number: Q3727A

To: Northshore Utility District

Project: Lake Forrest Park Reservoir and Booster Station Upgrade
Booster ATS, MTS, and Motor Control Equipment Supply

Reference: 90% drawing package
Specific Section: None Received
District Standards

Terms: Net 30

FOB: Lynnwood, WA

Freight: Prepaid and allowed

This quote is valid for **90 days**.

QCC is pleased to provide quotation for the above referenced project. Quality Controls Corp. (QCC) provides services and materials, FOB Lynnwood, WA, complete, ready for installation and field termination by others. QCC's quoted price does not include tax or the cost to bond this project.

Please call me with any technical questions or me if you have any questions concerning the pricing on this quotation.

Sincerely,

A handwritten signature in black ink that reads 'James T. Cross'.

James Cross

5015 – 208th Street S.W. Unit 1B Lynnwood, Washington 98036
Phone: 425.778.8280 Fax: 425.778.4541
Email: JamesC@Quality-Controls.com

Clarifications and Exclusions

1. Detailed project specifications were not available at the time of quotation. This proposal is based on the 90% drawing package and the information available to QCC regarding district hardware standards and the existing equipment at the booster station.
2. QCC provides the quotation for the equipment listed in the scope of work below only. The equipment quoted is based on the equipment QCC was directed to include in our scope of supply by the engineer and owner.
3. QCC does **NOT** provide any additional equipment or services other than what is listed in this proposal. QCC specifically excludes the following:
 - Utility Meters or Disconnects
 - Generator Receptacles
 - Power distribution panels
 - Junction Boxes and Handholes
 - Arc Flash, Short Circuit and Device Coordination Studies
 - Equipment installation, field wiring and termination services
 - Programming and Integration Services (Furnished under contract to the owner)
 - Antenna Masts and Mounting Structures
4. QCC does **NOT** provide the following unless specifically included in our bill of material:
 - Pipe, tubing, valves or fittings between the instrument and the process.
 - Conduit, wire or cable not integral to instrument or control panels supplied by QCC.
 - Mounting brackets, stanchions, supports or mounting pads not an integral part of the instrument.
 - Labor to install the equipment.
 - The Cost, (if due to local union regulations), to have local craftsman make adjustments or wiring modifications to our equipment during start-up and calibration.
 - Any material or services not in our quoted sections.
5. QCC provides the following unless specifically excluded on our bill of material:
 - Equipment shipped FOB factory with freight allowed, tailgate, destination.
 - Field wiring diagrams showing interconnection of field instruments and instrumentation panels.
 - Instruction manuals as required.
 - All necessary field start-up and calibration of the equipment we supply.

Pricing

Total Price for the Scope of Work Detailed Below:

\$ 79,300.00

Scope of Work

1. QCC supplies the following control panel for installation and field termination by others:
 - **01 ATS 01**, including the following major components:
 - Asco Series 300 ATS, 200A rated
 - Diversified SLM phase monitoring relay
 - Asco 440 series surge protection, 200kA TVSS
 - **01 MTS 01**, including the following major components:
 - *Siemens DTNF364S double throw non-fusible safety switch, 3ph, 600V 200A.*
 - Diversified SLM phase monitoring relay
 - Asco 440 series surge protection, 200kA TVSS
 - **01 MS 01 & 01 MS 02**, including the following major components each:
 - Main disconnect circuit breaker and door interlocked handle
 - 25HP VFD, Allen Bradley Powerflex 753 with IO modules and door mounted HIM
 - Control power transformer
 - 5% line and load reactors
 - Runtime meter
 - Required control relays, timers, terminals, and wiring.
 - **01 MS 03**, including the following major components:
 - Main disconnect circuit breaker and door interlocked handle
 - 75HP Reduced Voltage Soft Starter, Allen Bradley SMC Flex with and door mounted HIM.
 - 75HP rated FVNR bypass starter with overload relay
 - 75HP isolation contactor
 - Control power transformer
 - Motor rated Isolation and bypass contactors
 - Motor overload protection relay
 - Runtime and Ammeters
 - Required control relays, timers, terminals, and wiring.
 - **01 OIT 01**, operator trouble pushbutton station.

All control panels supplied by QCC will be UL listed and contain all required components and sub-assemblies.

2. *QCC supplies the required PLC, SCADA, and Telemetry programming for this project and associated testing, commissioning, and training.*
3. QCC supplies factory testing for all control panels included in this scope of work.

4. QCC supplies field start-up, calibration, commissioning, and training as required for all equipment and services included in this scope of work.
5. QCC provides updated CAD based as-built drawings of the existing PLC control panel for all work associated with this project.
6. QCC provides CAD-based drawings, Bill of Materials, and Operation and Maintenance manuals for all equipment included in this scope of work.