



**City of Ferndale**  
**Whatcom County, Washington**

Contract Documents  
for the Construction of

**FERNDALE SEWER PUMP STATIONS #2 & #3  
UPGRADES**

**BID DOCUMENTS**

City of Ferndale - Project # SS2014-02  
Wilson Engineering, LLC – Project # 2014-079

WILSON ENGINEERING, L.L.C.  
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June 8, 2016  
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**PUMP STATION #3**

TITLE

DRAWING NO.

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Legend & Abbreviations.....	C0.2
Existing Conditions.....	C1.1
T.E.S.C. Plan & Details. ....	C2.1
T.E.S.C. Narrative.....	C2.2
Demolition Site Plan.....	C2.3
Demolition - Mechanical.....	C2.4
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Exterior Building Plans & Elevations.....	C3.3
Civil Details.....	C4.1
Civil Details.....	C4.2
Civil Details.....	C4.3
Civil Details.....	C4.4
Mechanical Plans.....	M1.1
Mechanical Sections.....	M1.2
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## ADVERTISEMENT FOR BIDS

### ADVERTISEMENT FOR BIDS

**Project Name:** Pump Station #2 & #3 Upgrades  
**Bid Date:** June 28<sup>th</sup>, 2016 - 11:00 AM  
**Pre-Bid Meeting:** June 15<sup>th</sup>, 2016 – 12:30 PM  
**Engineer:** Wilson Engineering L.L.C., Bellingham, WA

NOTICE TO BIDDERS: Sealed bids will be received from contractors by the Public Works Director, City of Ferndale, 2095 Main Street, P.O. Box 936, Ferndale, WA 98248 until 11:00 AM, Tuesday, June 28<sup>th</sup>, 2016 for the Pump Station #2 & #3 Upgrades. All bids shall be received in sealed envelopes with “PUMP STATION #2 & #3 UPGRADES” marked plainly thereon. The Project involves removal and replacement of existing pump station mechanical equipment and general building & site improvements at two existing sewer lift stations. Work at each pump station shall be bid on separate bid schedules. Said bids will then and there be opened and read aloud. Bidders and other properly interested parties are invited to be present at the bid opening. Bids received after the time fixed for opening cannot be considered.

Please contact Liz Sterling, Wilson Engineering, (360) 733-6100, for project information. Only bids from bidders who have obtained the Contract Documents and have requested to be listed on the Planholders’ List, will be accepted. Copies of plans and specifications are on file for review and purchase from the Public Works Department at the City of Ferndale, 2095 Main Street, Ferndale, WA 98248. Hard copies are available for purchase (\$100 non-refundable fee), or may be downloaded from the City’s website at <http://www.cityofferndale.org/government/departments/public-works/public-works-projects/sanitary-sewer-pump-station-2-and-3-rehabilitation-project/>.

A deposit in the form of a postal money order, cashier’s check, or bond in the amount of 5% of the greatest amount bid must be submitted with each bid proposal. Should the successful bidder fail to enter into a contract or furnish a satisfactory contract bond within the time stated in the specifications, the deposit shall be forfeited to the City.

There will be a non-mandatory, pre-bid meeting for the Project held at 12:30 PM, Thursday, June 15<sup>th</sup>, 2016, at City Hall, 2095 Main Street, Ferndale, WA 98248. A site visit to each pump station will follow the meeting.

The City shall reject any bid not accompanied by bid security. The City reserves the right to reject any or all bids if such action is in the best interest of the City. The City reserves the right to award one or both pump stations. The City of Ferndale is an equal opportunity and affirmative action employer. Small, Minority and Women-owned businesses are encouraged to submit bids.

The project will be funded by the City of Ferndale. Neither the State of Washington nor any of its departments or employees are, or shall be, a party to this contract or any subcontract resulting from this solicitation for bids. All bidders must be licensed contractors registered in the State of Washington. All work performed on this project will be subject to prevailing state wage rates.

PUMP STATIONS #2 & #3 UPGRADES  
CITY OF FERNDAL, WA

ADVERTISEMENT FOR BIDS

## ADVERTISEMENT FOR BIDS

The project will be funded by the City of Ferndale. Neither the State of Washington nor any of its departments or employees are, or shall be, a party to this contract or any subcontract resulting from this solicitation for bids. All bidders must be licensed contractors registered in the State of Washington. All work performed on this project will be subject to prevailing state wage rates.

**Susan Duncan**  
**City Clerk - City of Ferndale**

# INSTRUCTION TO BIDDERS

## INSTRUCTIONS TO BIDDERS

### 1. Bidder Qualifications

- A. Prospective Bidders shall be registered by the Washington State Department of Labor and Industries in accordance with state law.
- B. Corporations shall be registered with the State of Washington, Office of the Secretary of State.
- C. Bidders shall be regularly employed in the type of work contemplated herein.

### 2. Bidder's Representations

Submittal of a bid shall be deemed conclusive evidence that the bidder has:

- A. Carefully examined the proposed work site, become familiar with conditions impacting the work, and incorporated such observations into the bid.
- B. Read and understands the bidding and contract documents.
- C. produced a bid that is without exception based on the materials, equipment and systems required by the bidding documents.
- D. produced a bid that is made based on a complete set of Bidding Documents. The Owner is not responsible for any bidding errors resulting from the use of incomplete documents.

### 3. Document Interpretation

- A. The bidder shall carefully study and review the Bid Documents and promptly report any errors or omissions to the Engineer.
- B. Bidders or sub-bidders shall make any requests for clarification to the Engineer. If so directed, the Engineer may require the Bidder to submit requests in writing.
- C. Interpretations, corrections and changes to the Bidding Documents shall be made by Addendum. Interpretations, corrections and changes to the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely on them.
- D. Substitutions shall not be considered prior to the receipt of bids. The Owner is not responsible for any bidding errors resulting from the use of substitutions.

### 4. Addenda

- A. Addenda will be mailed, emailed, delivered or faxed to all who are known by the Engineer to have received a complete set of Bidding Documents. Copies will also be provided to the locations where plans are available for review.
- B. The Bidder shall acknowledge receipt of addenda in their bid.

# INSTRUCTION TO BIDDERS

## 5. Bidding Procedures

- A. To be considered responsive, bids shall be submitted on the enclosed form and shall be filled in by typewriter or manually in ink.
- B. The Bid form shall include the Bidder's legal name exactly as it appears on his/her registration. Form shall be signed by the individual authorized to represent the Bidder.
- C. A list of subcontractors individually accounting for more than 10-percent of the Contract Sum and the work said subcontractor will perform shall be submitted with the bid or within one hour of the published bid time.

## 6. Pre-Bid Meeting

- A. There will be a pre-bid meeting at date and time shown on the Invitation to Bid.
- B. Prior to attending the pre-bid meeting, bidders shall have carefully studied and compared all drawings, specifications and other instructions to identify any inconsistency or omission. Also any discrepancies between the contract documents and the physical condition of the locality shall be identified. The intent is to identify any questions or concerns regarding the proposed improvements that the bidders may have.

## 7. Bid Security

- A. Each Bid shall be accompanied by a Bid Security in the form of a cashier's check, certified check or surety bond equal to 5-percent of the total Bid amount. Security shall pledge that the Bidder shall enter into a contract with the Owner in accordance with the terms of the Bid Documents including furnishing payment and performance bonds.
- B. In the event a Bidder refuses to enter into such contract or fail to furnish such bonds as required, the bid security shall be forfeited to the Owner as liquidated damages.
- C. The Owner may retain bid securities submitted with the bid until such time as; (1) the contract has been executed and bonds received, (2) 30-days have elapsed, (3) all Bids have been rejected.

## 8. Submission of Bids

- A. Bids shall be submitted in a sealed envelope. Envelopes shall clearly show (1) the project's name and owner as it appears on the Bid Solicitation, (2) the Contractor's name and registration number, and (3) the time and date of the bid opening.
- B. Bids received after the published bid time and date will be returned unopened.
- C. Bids submitted by mail shall conform with the above requirements and be sent to City of Ferndale – City Hall, 2095 Main Street, P.O. Box 936, Ferndale, WA 98248, Attention: ***Pump Station #2 & #3 Upgrades Bid.*** Bidder shall assume full responsibility for timely delivery of bid documents and the Owner is not responsible



## INSTRUCTION TO BIDDERS

for bids received late.

- D. Oral, facsimile or telegraphic bids, modifications, or adjustments are not valid and will not receive consideration.

### **9. Modification or Withdrawal of Bid**

- A. After the bid opening, bids shall not be withdrawn, modified or canceled by the Bidder during the stipulated time period.
- B. Bids submitted by mail prior to the bid opening may be modified or withdrawn by notice to the Owner. Such notice shall be in writing and signed by the same authorized individual signing the bid form. If such modifications or withdrawals are transmitted electronically, the original document shall be mailed and postmarked on or before the date and time of the bid opening.
- C. Withdrawn bids may be resubmitted up until the date and time of the bid opening and in accordance with these Instructions to Bidders.
- D. Bid security shall be in an amount sufficient for the bid as modified or resubmitted.

### **10. Opening of Bids**

- A. Bids received on time will be opened and read aloud at the time and place stipulated in the Bid Solicitation. An abstract or tabulation will be made available to Bidders.
- B. Should a Bidder discover an error in his/her bid after submittal, the Bidder may request withdrawal of the bid with the following conditions:
  - 1. The Bidder must document the error(s) for the Owner. The Owner will review documentation and determine if the bid withdrawal and release of the Bid Security will be allowed.
  - 2. The Owner must receive the Bidder's intent to withdraw his/her bid submittal in writing no more than 30-hours after the bid opening (faxed notice is acceptable).
  - 3. The Owner alone will approve or disapprove the request for withdrawal. If approved, the Bidder will no longer be considered for Contract award and the Bid Security will be returned.
  - 4. If the Bidder fails to notify the Owner in accordance of an error as set forth above, and the Owner awards the Bidder the Contract, the Bidder shall either execute the Contract for the bid amount or withdraw the bid and forfeit the Bid Security.

# INSTRUCTION TO BIDDERS

## 11. Rejection of Bids

- A. The Owner reserves the right to reject any or all bids, reject a bid not accompanied by a proper bid security or other material required by the Bidding Documents, or reject a bid which is in anyway irregular or incomplete.

## 12. Acceptance of Bids

- A. The Owner intends to award the Contract to the lowest responsible responsive bidder whose bid submittal does not exceed available funds and conforms with the requirements described herein. The Owner shall have the right to waive informalities or irregularities in a bid submittal and to accept the bid that, in the opinion of the Owner, is in the Owner's best interest.
- B. Where called for, the Owner reserves the right to accept bid schedules and bid alternates in any combination and determine the low bidder on the basis of the base bid schedules and alternates accepted.

## 13. Contract Bond

- A. Bidders shall provide a contract bond as attached. Contract bond shall be signed by an approved surety or sureties, be in the full contract amount, and cover the faithful performance of the work described in the Contract Documents. The Contract Bond shall be in full effect until one year after Substantial Completion.

## 14. Contract Agreement and Award

- A. Owner's execution of the contract is contingent on the timely receipt of the Contract Bond and other submittals required by the Contract Documents.
- B. The award of the Contract, if it be awarded, shall be made within 45-days of the bid opening to the Bidder deemed by the Owner to be the lowest responsible responsive bidder.
- C. The 45-day period may be extended by mutual consent of the bidder and the Owner. If, after the 45-day period and no agreement to time extension has been made, the Contractor may withdraw his bid.
- D. The Owner reserves the right to award the bid schedules and bid alternates in any combination. The Owner reserves the right to award either pump station alone or both pump stations together.

## 15. Execution of Contract

- A. The Bidder to whom the contract has been awarded shall sign the contract and return it and other submittals within 10 calendar days of the award.
- B. The Owner shall have the right to reject a contract submitted by a bidder if it is qualified by reservations or conditions stipulated by the bidder or its surety.
- C. No bid is binding on the Owner until executed by the City of Ferndale. No work shall be performed within the project site prior to the Notice to Proceed. Material or equipment orders or work undertaken away from the project site prior to

## INSTRUCTION TO BIDDERS

contract execution shall be at the sole risk of the bidder.

### **16. Failure to Execute Contract**

- A. If the bidder to whom award has been made fails to sign the contract and furnish satisfactory bonds within 10 calendar days of the award, or declares in writing its intent not to execute the contract, the bid security will be forfeited to the Owner and the second lowest responsible bidder will be notified of its receipt of award.
- B. If the second lowest responsible responsive bidder fails to execute the contract and furnish bonds within 20 calendar days after such notification, forfeiture of its bid security shall also be made and the third lowest responsible responsive bidder will be notified of its receipt of award, and in like manner until either (1) the contract and bond are executed by a responsible responsive bidder, (2) or further bid submittals are rejected, or (3) the number of bids submitted is exhausted.
- C. If the contract is not executed by the Contractor and Owner within the stipulated time, and it is evident that circumstances warrant an extension of time, the Owner may extend the time for executing the contract and/or bond for a period not to exceed 10 additional calendar days.

### **17. Return of Bid Security**

- A. When bid submittals have been examined, bid securities and deposits accompanying submittals ineligible from further consideration will be returned.
- C. All other bid securities and deposits will be held until the contract has been properly executed, after which bid securities and deposits except those subject to forfeiture will be returned.



## SCOPE OF WORK

### SCOPE OF WORK AND DESCRIPTION OF BID ITEMS

Payment for the various items of the Proposal, as further specified herein, shall include all compensation to be received by the CONTRACTOR for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of WORK being described, as necessary to complete the various items of the WORK all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA).

No separate payment will be made for any item that is not specifically set forth in the Proposal, and all costs therefore shall be included in the prices named in the Proposal for the various appurtenant items of WORK.

### **BASE BID ITEMS**

#### **Bid Schedule A - Pump Station #2 Upgrades**

1. **Mobilization** – Included in mobilization shall be all costs associated with insurance, bonding, securing and developing a construction staging area, and bringing equipment and miscellaneous facilities to the staging area. Mobilization shall be per WSDOT. Measurement will be lump sum and payment will be for percentage of completion.
2. **Trench Safety Excavation (TESC) Provisions** - For all trenches exceeding a depth of four feet, all costs for adequate trench safety systems shall be identified as a separate bid item in compliance with Chapter 39.04 RCW. The purpose of this provision is to ensure that the bidder agrees to comply with all relevant trench safety requirements of Chapter 49.17 RCW. This bid amount shall be considered part of the total base bid. Include a lump sum dollar amount (even if the value is \$0.00) to be considered responsive to the bid solicitation. Measurement will be lump sum and payment will be for percentage of completion.
3. **Temporary Erosion and Sedimentation Control** – Includes all costs associated with determining, developing, and implementing effective erosion and sediment control measures throughout the duration of the project in accordance with the Contract Plan and Specifications and state and local regulations, including but not limited to: quarry spall construction entrances, siltation ponds, silt fencing, straw bales, check dams, and other sediment trapping devices; slope stabilization measures; low-impact construction practices; and project sequencing. Measurement and payment will be lump sum and payment will be for percentage of completion.
4. **Project Schedule** – Includes all costs associated with developing and updating the project schedule including all required submittal updates included under the Contract. Measurement will be lump sum and payment will be for percentage of completion

## SCOPE OF WORK

**5. Demolition** – Includes all costs associated with demolition of the following work areas as called for in the specifications and detailed on the drawings. Measurement will be lump sum and payment will be for percentage completion. Work includes but is not limited to:

- A. Mechanical Demolition – Pumps, shafts, guards, supports; piping, valves, pipe supports; overhead monorail & supports; pump room sump pump & piping; misc. wet well hardware (as required for replacement); membrane roof, ventilators, skylights; exhaust fans, ducting, & supports; cut new 3'x3' openings.
- B. Electrical Demolition – Pump motors, motor control center, service disconnect, automatic transfer switch, dry transformer, panelboard, motor starters, circuit breaker for 100 amp storm water PS #8, generator, natural gas supply, adjacent wall mounted louvers, wall mounted exhaust fan, generator exterior muffler system, fluorescent light fixtures. *Maintain and protect recently upgraded PLC control panel and telemetry panel.*
- C. Site Demolition – Sawcutting, catch basin removal, asphalt grinding and pavement removal, removal of bollards, skate rails, grandstand, trash can.

**6. Mechanical Improvements** – Includes all costs associated with procurement and installation of the following work items as called for in the specifications and detailed on the drawings. *Procurement exception includes all material detailed in Specification Section 11100 as pre-purchased by the City.* Measurement will be lump sum and payment will be for percentage completion. Work includes but is not limited to:

- A. Wastewater Pumps, Piping, Valves, Supports – Pumps and pump accessories, intake & discharge elbows, pump mounting plates; piping, fittings, couplings, misc. pipe appurtenances & instrumentation; valves; pipe & equipment supports, wet well ladder, grating.
- B. Miscellaneous Mechanical Systems Replacement – Exhaust blowers, ducting, & supports; louvers & dampers; unit heater system; sump pump system; air gap water system; hoisting & pump removal equipment and supports.
- C. Painting & Coating – Pressure washing, sandblasting, painting & coating prep, priming, painting, coating, and all clean-up.

**7. Electrical & Control Improvements** – Includes all costs associated with procurement and installation of the following work items as called for in the specifications and detailed in the drawings. Measurement will be lump sum and payment will be for percentage completion. Work includes but is not limited to:

- A. Power Distribution Equipment – Main service disconnect, automatic transfer switch, 480-120/208V Transformer, panelboards & power distribution, reconnect 100 amp 480V power feeder to storm water PS#8, electrical and controls for sump pump system, trolley hoist system, air gap water system, LED lighting fixtures & battery-backed emergency lighting.
- B. Standby Power Generator – Generator, generator enclosure, & generator mounting platform; Underground raceway with power feeder and control signals from the generator to the automatic transfer switch; 500-gallon propane tank (Rental) with

## SCOPE OF WORK

accompanying supply piping, regulating equipment & mounting platform.

- C. Motor Control Center with Variable Frequency Drives (VFDs) – VFDs and local HOA control stations.
  - D. Pump Control Telemetry Cabinets & Miscellaneous Alarm Equipment – Existing pump telemetry cabinet to be reused, add I/O ; Replacement of revolving alarm light.
  - E. Flowmeter – Magnetic flowmeter with electrical & remote display. *Flowmeter vault and piping improvements to be included in Bid Item #8.*
  - F. Level Control Equipment – Level pressure transducer, mechanical float level control switches.
  - G. Flood Sensor & Operator-in-Trouble Buttons
- 8. Site & Building Improvements** – Includes all costs associated with procurement and installation of the following work items as called for in the specifications and detailed in the drawings. Measurement will be lump sum and payment will be for percentage completion. Work includes but is not limited to:
- A. Traffic Control
  - B. Temporary Bypass Pumping System
  - C. Sewer Force Main Improvements – trenching, shoring; & backfill, dewatering as necessary; draining and plugging old force main; piping, valves, fittings, and thrust blocking; connection to existing force main at bridge; installation of new force main piping through the station wall; flowmeter vault and piping; bypass port and vault, cleaning and testing.
  - D. Miscellaneous Utility Improvements – Upgrade primary power equipment and meter at station; provide all coordination, trenching & backfill to relocated gas meter; install new propane piping; relocated water meter and provide new service line and RPBFP assembly and enclosure; coordinate for new telephone pedestal and conduit installation; coordinate for fiber optic conduit and handhole installation.
  - E. Building Improvements – Replace roof system, skylights, doors & frames; masonry repairs and patching; removal of abandoned metal supports and appurtenances from interior and exterior masonry walls, remove and replace antenna.
  - F. Miscellaneous Site Improvements – Storm trench and valve installation, paving replacement and overlays, site grading, gate and gate stops; barrier rails; hydroseeding and miscellaneous site cleanup.
- 9. Project Closeout** – Includes all costs associated with performing all closeout activities as called for in the specifications and detailed in the drawings. Measurement will be lump sum and payment will be for percentage completion. Work includes but is not limited to:
- A. O& M Manuals & Staff Training
  - B. Start-up & Testing

## SCOPE OF WORK

- C. Project Closeout Activities – Punchlist, final submittals & releases, warranty documentation, as-builts, & final cleanup.

### **Bid Schedule B - Pump Station #3 Upgrades, Lump Sum**

1. **Mobilization** – Included in mobilization shall be all costs associated with insurance, bonding, securing and developing a construction staging area, and bringing equipment and miscellaneous facilities to the staging area. Mobilization shall be per WSDOT. Measurement will be lump sum and payment will be for percentage of completion.
2. **Trench Safety Excavation (TESC) Provisions** - For all trenches exceeding a depth of four feet, all costs for adequate trench safety systems shall be identified as a separate bid item in compliance with Chapter 39.04 RCW. The purpose of this provision is to ensure that the bidder agrees to comply with all relevant trench safety requirements of Chapter 49.17 RCW. This bid amount shall be considered part of the total base bid. Include a lump sum dollar amount (even if the value is \$0.00) to be considered responsive to the bid solicitation. Measurement will be lump sum and payment will be for percentage of completion.
3. **Temporary Erosion and Sedimentation Control** – Includes all costs associated with determining, developing, and implementing effective erosion and sediment control measures throughout the duration of the project in accordance with the Contract Plan and Specifications and state and local regulations, including but not limited to: quarry spall construction entrances, siltation ponds, silt fencing, straw bales, check dams, and other sediment trapping devices; slope stabilization measures; low-impact construction practices; and project sequencing. Measurement and payment will be lump sum and payment will be for percentage of completion.
4. **Project Schedule** – Includes all costs associated with developing and updating the project schedule including all required submittal updates included under the Contract. Measurement will be lump sum and payment will be for percentage of completion.
5. **Demolition** – Includes all costs associated with demolition of the following work areas as called for in the specifications and detailed on the drawings. Measurement will be lump sum and payment will be for percentage completion. Work includes but is not limited to:
  - A. Mechanical Demolition – Pumps, shafts, guards, supports; piping, valves, pipe supports; pump room sump pump & piping; misc. wet well hardware (as required for replacement); membrane roof, ventilators, skylights; exhaust fans, ducting, & supports; cut new 3'x3' openings.
  - B. Electrical Demolition – Pump motors, motor control center, service disconnect, automatic transfer switch, dry transformer, panelboard, motor starters, generator, natural gas supply, adjacent wall mounted louvers, wall mounted exhaust fan, generator exterior muffler system, fluorescent light fixtures. *Maintain and protect recently upgraded PLC control panel and telemetry panel.*
  - C. Site Demolition – Sawcutting, asphalt grinding and pavement removal, removal of bollards.



## SCOPE OF WORK

- 6. Mechanical Improvements** – Includes all costs associated with procurement and installation of the following work items as called for in the specifications and detailed on the drawings. *Procurement exception includes all material detailed in Specification Section 11100 as pre-purchased by the City.* Measurement will be lump sum and payment will be for percentage completion. Work includes but is not limited to:
- A. Wastewater Pumps, Piping, Valves, Supports – Pumps and pump accessories, intake & discharge elbows, pump mounting plates; piping, fittings, couplings, misc. pipe appurtenances & instrumentation; valves; pipe & equipment supports, wet well ladder, grating.
  - B. Miscellaneous Mechanical Systems Replacement – Exhaust blowers, ducting, & supports; louvers & dampers; unit heater system; sump pump system; air gap water system; hoisting & pump removal equipment and supports.
  - C. Painting & Coating – Pressure washing, sandblasting, painting& coating prep, priming, painting, coating, and all clean-up.
- 7. Electrical & Control Improvements** – Includes all costs associated with procurement and installation of the following work items as called for in the specifications and detailed in the drawings. Measurement will be lump sum and payment will be for percentage completion. Work includes but is not limited to:
- A. Power Distribution Equipment – Main service disconnect, automatic transfer switch, 480-120/208V Transformer, panelboards & power distribution, electrical and controls for sump pump system, trolley hoist system, air gap water system, LED lighting fixtures & battery-backed emergency lighting.
  - B. Standby Power Generator – Generator, generator enclosure, & generator mounting platform; Underground raceway with power feeder and control signals from the generator to the automatic transfer switch; 500-gallon propane tank (Rental) with accompanying supply piping, regulating equipment & mounting platform.
  - C. Motor Control Center with Variable Frequency Drives (VFDs) – VFDs and local HOA control stations.
  - D. Pump Control Telemetry Cabinets & Miscellaneous Alarm Equipment – Existing pump telemetry cabinet to be relocated and reused, add I/O ; Replacement of revolving alarm light.
  - E. Flowmeter – Magnetic flowmeter with electrical & remote display. *Flowmeter vault and piping improvements to be included in Bid Item #8.*
  - F. Level Control Equipment – Level pressure transducer, mechanical float level control switches.
  - G. Flood Sensor & Operator-in-Trouble Buttons
- 8. Site & Building Improvements** – Includes all costs associated with procurement and installation of the following work items as called for in the specifications and detailed in the drawings. Measurement will be lump sum and payment will be for percentage completion. Work includes but is not limited to:

## SCOPE OF WORK

- A. Traffic Control
  - B. Temporary Bypass Pumping System
  - C. Sewer Force Main Improvements – trenching, shoring; & backfill, dewatering as necessary; draining and plugging old force main; piping, valves, fittings, and thrust blocking; connection to existing force main; installation of new force main piping through the station wall; flowmeter vault and piping; bypass port and vault, cleaning and testing.
  - D. Miscellaneous Utility Improvements – Upgrade primary power equipment and meter at station; provide all coordination, trenching & backfill to relocated gas meter; install new propane piping; relocated water meter and provide new service line and RPBFP assembly and enclosure.
  - E. Building Improvements – Replace roof system, skylights, doors & frames; masonry repairs and patching; removal of abandoned metal supports and appurtenances from interior and exterior masonry walls, remove and replace antenna.
  - F. Miscellaneous Site Improvements – paving replacement, site grading, clean drainage ditch and restore inlet/outlet riprap, weed control, planting shrubs, mulch installation, hydroseeding and miscellaneous site cleanup.
- 9. Project Closeout** – Includes all costs associated with performing all closeout activities as called for in the specifications and detailed in the drawings. Measurement will be lump sum and payment will be for percentage completion. Work includes but is not limited to:
- A. O& M Manuals & Staff Training
  - B. Start-up & Testing
  - C. Project Closeout Activities – Punchlist, final submittals & releases, warranty documentation, as-builts, & final cleanup.

## **FORCE ACCOUNT ITEM**

- 1. Programming Services – Pump Station #2**, price based on Force Account Total Sum (FA)
- A. Measurement for payment for Programming by L2 Systems, LLC (phone: 425-258-2402) will be based on the actual force account total of finished Programming Services work for Bid Schedule A - Base Bid Items for startup and testing of the complete system (including all PLC, Operator Interface, and SCADA System programming) as directed by City Staff and per Contract Documents. Force account work to be per WSDOT Standard Specifications, Section 1-09.6.
  - B. Payment for Programming will be made at the total sum of the actual force account, said payment will constitute full compensation for all WORK which

## SCOPE OF WORK

shall be in accordance with the applicable specifications, including 2016 WSDOT requirements.

### 2. **Programming Services – Pump Station #3**, price based on Force Account Total Sum (FA)

A. Measurement for payment for Programming by L2 Systems, LLC (phone: 425-258-2402) will be based on the actual force account total of finished Programming Services work for Bid Schedule B - Base Bid Items for startup and testing of the complete system (including all PLC, Operator Interface, and SCADA System programming) as directed by City Staff and per Contract Documents. Force account work to be per WSDOT Standard Specifications, Section 1-09.6.

B. Payment for Programming will be made at the total sum of the actual force account, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications, including 2016 WSDOT requirements.

### 3. **Misc. Additional Work Items – Pump Station #2 & #3 (Requires Written Authorization)**, price based on Force Account Total Sum (FA)

A. Measurement for payment for Misc. Additional Work Items will be based on the actual force account total of finished Misc. Additional Work Items for ADDITIONAL OWNER REQUESTED WORK ONLY as directed by City Staff and per Contract Documents. Examples of work that could be covered under this Force Account Item include leak repair in the existing wet well, or repair/replacement of miscellaneous hardware on the existing aluminum walkways, handrailing, and stairs, etc. Force account work to be per WSDOT Standard Specifications, Section 1-09.6.

B. Payment for Misc. Additional Work Items will be made at the total sum of the actual force account, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications, including 2016 WSDOT requirements.

## **ADDITIVE UNIT QUANTITY BID ITEMS (Requires Written Authorization)**

### 1. Overexcavation of Unsuitable Material, price based on Cubic Yards (CY)

Includes all costs associated with overexcavation and material disposal in accordance with Section 02315 3.05 Unsuitable Trench Overexcavation. Measurement and payment will be per CY of overexcavated material as measured in the field.

### 2. Foundation Backfill for Overexcavation of Unsuitable, price based on Tons (TON) PUMP STATIONS #2 & #3 UPGRADES

CITY OF FERNDAL, WA

SCOPE OF WORK

Page 7

## SCOPE OF WORK

Includes all costs associated with providing, placing, compacting, and testing Foundation Backfill per WSDOT Section 9-03.12(1) Gravel Backfill for Foundations, Class A, minimum density 95%. Measurement and payment will be per TON of finished Foundation Backfill for Overexcavation work.

3. Crushed Surfacing Top Course, price based on Tons (TON)

Includes all costs associated with providing, spreading, compacting, and testing Crushed Surfacing Top Course per WSDOT Section 9-03.9(3) Crushed Surfacing Top Course, minimum density 95%. Measurement and payment will be per TON of finished Crushed Surfacing Top Course work.

4. Bank Run Gravel Backfill, price based on Tons (TON)

Includes all costs associated with providing, spreading, compacting, and testing Bank Run Gravel per WSDOT Section 9-03.19 Bank Run Gravel Backfill, minimum density 95%. Measurement and payment will be per TON of finished Bank Run Gravel Backfill work.

5. Quarry Spalls, price based on Tons (TON)

Includes all costs associated with providing, spreading, compacting, and testing Quarry Spalls per WSDOT Section 9-13.1(5) Quarry Spalls (max. 6-in). Measurement and payment will be per TON of finished Quarry Spalls work.

## **BID PACKAGE**



# PROPOSAL

## PROPOSAL

Name of Bidder: \_\_\_\_\_

Submittal of this Bid proposal warrants that the undersigned has:

1. Examined the site, plans and specifications, and laws and ordinances governing the work;
2. Agreed to perform the work complete and provide a facility in full operation, including all labor, materials and equipment in accordance with the terms and provisions of the Contract Documents and for the prices tendered;
3. Agreed to perform the work in accordance with the time of completion as set forth in Supplemental Conditions, after which specified liquidated damages will be assessed.
4. Not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action restraining free competitive bidding for the project.

## BID SCHEDULE

The Owner reserves the right to accept bid schedules and bid alternates in any combination and determine the low bidder on the basis of the base bid schedules and alternates accepted. Should the use of alternate equipment require any changes in the layout or design of the facilities shown on the drawings, including modifications to electrical, structural, or mechanical work, the undersigned agrees to prepare and submit detailed drawings and specifications to the Engineer for review and approval showing all modifications in structures, piping, electrical, and mechanical work required to adapt the plans to the alternate equipment. The deduction amounts listed below shall take into account all required modifications and the contract time shall remain unchanged by selecting an Alternative.

### BASE BID ITEMS:

#### BID SCHEDULE A – Pump Station No. 2

ITEM		APPROX QTY	UNIT	UNIT PRICE	AMOUNT
1	Mobilization	1	LS		
2	Trench Safety Excavation Provisions	1	LS		
3	TESC Provisions	1	LS		
4	Project Schedule	1	LS		
5	Demolition	1	LS		
6	Mechanical Improvements	1	LS		
7	Electrical & Control Improve.	1	LS		
8	Site & Building Improvements	1	LS		
9	Project Closeout	1	LS		
SUBTOTAL ITEMS 1-9					





# PROPOSAL

## **BID SCHEDULE B – Pump Station No. 3**

ITEM		APPROX QTY	UNIT	UNIT PRICE	AMOUNT
1	Mobilization	1	LS		
2	Trench Safety Excavation Provisions	1	LS		
3	TESC Provisions	1	LS		
4	Project Schedule	1	LS		
5	Demolition	1	LS		
6	Mechanical Improvements	1	LS		
7	Electrical & Control Improve.	1	LS		
8	Site & Building Improvements	1	LS		
9	Project Closeout	1	LS		
<b>SUBTOTAL ITEMS 1-9</b>					

## **FORCE ACCOUNT ITEMS:**

## **BID SCHEDULE C – Force Account Items**

ITEM Written Authorization Required		APPROX QTY	UNIT	UNIT PRICE	AMOUNT
1	Programming Services – Pump Station #2	1	FA	--	\$25,000.00
2	Programming Services – Pump Station #3	1	FA	--	\$25,000.00
3	Miscellaneous Additional Work Items – Pump Station #2 & #3	1	FA	--	\$50,000.00
<b>SUBTOTAL ITEMS 1-3</b>					<b>\$100,000.00</b>



# PROPOSAL

## FORCE ACCOUNT ITEMS:

### BID SCHEDULE D – Additive Unit Quantity Bid Items

ADDITIVE OR DEDUCTIVE UNIT COST BIDS FOR EQUITABLE ADJUSTMENT IN BASE BID PROJECT SCOPE. Written authorization required.		APPROX QTY	UNIT	UNIT PRICE	AMOUNT
A	Overexcavation of Unsuitable	200	CY		
B	Foundation Backfill	100	ton		
C	Crushed Surfacing Top Course	100	ton		
D	Bank Run Gravel Backfill	100	ton		
E	Quarry Spalls	100	ton		
SUBTOTAL ITEMS A-E					

	SUBTOTAL BID SCHEDULES A-D		\$
	8.7% SALES TAX (City of Ferndale)		\$
	TOTAL BID		\$

TOTAL in Words \_\_\_\_\_



# PROPOSAL

## LIST OF MANUFACTURERS

The named manufacturer for some equipment items are listed below. Contractor is to circle his selected manufacturer, when a choice is available. Contractor's Base Bid Item #1 - Pump Station #2 & #3 Upgrades is to be based on the following:

Equipment

Manufacturer

Pumps

Flygt (Pre-Purchased by Owner)

Generator

Cummins Onan, Kohler, or Caterpillar

## EQUIPMENT ALTERNATES:

- A. Furnish Pumps other than specified. Lump Sum Deduction \$ - Deduction \_\_\_\_\_  
Amount in Words: \_\_\_\_\_  
Manufacturer & Model No. \_\_\_\_\_
- B. Furnish Generator other than specified. Lump Sum Deduction \$ - Deduction \_\_\_\_\_  
Amount in Words: \_\_\_\_\_  
Manufacturer & Model No. \_\_\_\_\_

Contractor: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Date: \_\_\_\_\_

Contractor's State License Number: \_\_\_\_\_

By: \_\_\_\_\_ Title: \_\_\_\_\_  
Signature

Name Printed \_\_\_\_\_

The bidder acknowledges receipt of the following addenda, and agrees to the conditions set forth therein, by initializing the appropriate place:

Addendum No. 1 \_\_\_\_ Addendum No. 2 \_\_\_\_ Addendum No. 3 \_\_\_\_ Addendum No. 4 \_\_\_\_



## BID BOND

## BID BOND

## Deposit Statement

Herewith find a deposit in the form of certified check, or cashier's check, in the amount of Five percent (5%) of maximum amount bid (Total for Bid Schedules A-D + sales tax) in the attached Proposal.

## Bid Bond

KNOW ALL MEN BY THESE PRESENTS:

That we \_\_\_\_\_, as Principal and \_\_\_\_\_, as Surety, are held firmly bound unto the City of Ferndale, Washington, as Oblige, in the penal sum of Five percent (5%) of maximum amount bid (Total for Bid Schedules A-D + sales tax) in the attached Proposal, for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally by these presents.

The conditions of this obligation are such that if the Obligee shall make any award to the Principal for Pump Station #2 & #3 Upgrades, Ferndale, Washington, according to the terms of the Proposal or Bid made by the Principal therefore, and the Principal shall duly make and enter into a contract with the Obligee in accordance with 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 to do so, 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 \_\_\_\_\_, 2016.

By: \_\_\_\_\_  
Principal                      Surety





# NON-COLLUSION AFFIDAVIT

## NON-COLLUSION AFFIDAVIT

STATE OF WASHINGTON )  
 ) ss.  
COUNTY OF WHATCOM )

The undersigned, being duly sworn, deposes and says that the person, firm, association, co-partnership or corporation herein named, has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in the restraining of free competitive bidding in the preparation and submission of a proposal to the City of Ferndale for consideration in the award of a contract on the improvement named above.

\_\_\_\_\_  
Contractor

Subscribed and sworn to before me this \_\_\_\_ day of \_\_\_\_\_, 2016.

Notary Public in and for the  
State of Washington, residing at



# CONTRACTORS QUALIFICATIONS

## CONTRACTORS QUALIFICATIONS

The below listed reference information shall be submitted with the Bid.

Bidder to list three previous wastewater facility/pump station projects with similar value (\$800,000+) completed by Bidder as prime contractor. Bidder shall have successfully completed with their own equipment and personnel a minimum of three similar projects in the last six years to be considered qualified.

1. Project: \_\_\_\_\_  
(Name and Location)

Contract Amount: \_\_\_\_\_

Reference: \_\_\_\_\_  
(Company Name, Contact & Telephone)

2. Project: \_\_\_\_\_  
(Name and Location)

Contract Amount: \_\_\_\_\_

Reference: \_\_\_\_\_  
(Company Name, Contact & Telephone)

3. Project: \_\_\_\_\_  
(Name and Location)

Contract Amount: \_\_\_\_\_

Reference: \_\_\_\_\_  
(Company Name,  
Contact & Telephone)

Bidder shall provide the following information.

1. Resume of superintendent proposed for project.
2. List and provide references (Owner and Engineer) for any project within the last three years which have involved disputes for which the Contractor filed a claim resulting in formal dispute resolution, third-party mediation or arbitration, or a lawsuit.
3. List and provide references (Owner and Engineer) for all public works contracts in which the Contractor was sued by the Owner.



# BID SUBMITTAL CHECKLIST

## BID SUBMITTAL CHECKLIST

The bidder is advised to use the following list to assemble all forms required to be submitted with their bids. In accordance with RCW 39.30.060, bidders may submit the required documentation in two sealed packages.

PART 1 - Must be received with bid prior to the Bid Date and Time and include:

1. \_\_\_\_\_ Bid Proposal
2. \_\_\_\_\_ Bid Bond
3. \_\_\_\_\_ Non-Collusion Affidavit
4. \_\_\_\_\_ Contractor Qualifications

PART 2 - Must be received prior to 1 hour after the Bid Date and Time and include:

1. \_\_\_\_\_ List of Subcontractors
2. \_\_\_\_\_ Subcontractor Qualifications



# BIDS ON PUBLIC WORKS - IDENTIFICATION, SUBSTITUTION OF SUBCONTRACTORS

## **BIDS ON PUBLIC WORKS – IDENTIFICATION, SUBSTITUTION OF SUBCONTRACTORS (RCW 39.30.060)**

The prime contractor shall submit as part of the bid, or within one hour after the published bid submittal time, the names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of: plumbing; and electrical, or to name itself for the work. The prime contract bidder shall not list more than one subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the prime contract bidder must indicate which subcontractor will be used for which alternate. Failure of the prime contract bidder to submit as part of the bid the names of such subcontractors or to name itself to perform such work or the naming of two or more subcontractors to perform the same work shall render the prime contract bidder's bid nonresponsive and, therefore, void.

Plumbing Subcontractor: \_\_\_\_\_

Address: \_\_\_\_\_ Phone: \_\_\_\_\_

Electrical Subcontractor: \_\_\_\_\_

Address: \_\_\_\_\_ Phone: \_\_\_\_\_





## SUBCONTRACTORS QUALIFICATIONS

The below listed reference information will be required 1 hour after the bid opening for all listed subcontractors of the apparent low bidder. The information may also be asked of the subcontractors of the next two low bidders at that time.

Bidder to list the following information for **three** projects for **each** of the subcontractors accounting for more than 10 percent of total bid amount. The selected projects must be of equivalent size and scope to the portion of work the subcontractor will complete on this project, and the subcontractor must have completed the work using his/her own personnel and equipment.

*(This sheet shall be duplicated for each Subcontractor)*

Name of Subcontractor: \_\_\_\_\_

1. Project: \_\_\_\_\_  
(Name and Location)

Contract Amount: \_\_\_\_\_

Reference: \_\_\_\_\_  
(Company Name, Contact & Telephone)

2. Project: \_\_\_\_\_  
(Name and Location)

Contract Amount: \_\_\_\_\_

Reference: \_\_\_\_\_  
(Company Name, Contact & Telephone)

3. Project: \_\_\_\_\_  
(Name and Location)

Contract Amount: \_\_\_\_\_

Reference: \_\_\_\_\_  
(Company Name, Contact & Telephone)



## **CONTRACT FORMS**

INFORMATIONAL



## NOTICE OF AWARD

### NOTICE OF AWARD

To: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

For: City of Ferndale  
Pump Stations #2 & #3 Upgrades

The Owner has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids and Information for Bidders.

You are hereby notified that your BID has been ACCEPTED in accordance with your proposal for the amount of \$\_\_\_\_\_.

You are required by the Information for Bidders to execute the Contract and furnish the required Bond(s) and certificates of insurance within ten (10) calendar days from the date of this Notice of Award.

If you fail to execute said Contract and furnish said Bond(s) within ten (10) days from the date of this Notice, the City will be entitled to consider all your rights arising out of the City's acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the City within 3 days of its receipt.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 2016

\_\_\_\_\_  
City of Ferndale  
Owner

By \_\_\_\_\_  
Title \_\_\_\_\_

---

#### ACCEPTANCE OF NOTICE:

*Receipt of this NOTICE OF AWARD is hereby acknowledged:*

By .

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 2016

By . \_\_\_\_\_ *Printed Name*

Title .



# CONTRACT

## CONTRACT FOR: PUMP STATIONS #2 & #3 UPGRADES FERNDAL, WASHINGTON

This Contract, made and entered into this \_\_\_\_ day of \_\_\_\_, 2016 by and between the City of Ferndale, hereinafter called the "Owner" and \_\_\_\_\_, hereinafter called the "Contractor".

### WITNESSETH:

That in consideration of the terms and conditions contained herein and attached and made a part of this Contract, the parties hereto covenant and agree as follows:

1. The Contractor shall do all of the work and furnish all of the labor, materials, tools and equipment for the construction of the improvements and shall perform any changes in the work, all in full compliance with the contract documents entitled "Pump Stations #2 & #3 Upgrades, Ferndale, Washington".

The "Bid Proposal", "Specifications and Conditions", "Contract Forms", and the "Plans" sections contained in said contract documents are hereby referred to and by reference made a part hereof.

2. The Owner hereby promises and agrees with the Contractor to employ, and does employ the Contractor to furnish the labor, materials, tools and equipment, and to and cause to be done the above-described work, and to complete and finish the same in accordance with the said contract documents and the terms and conditions herein contained, and hereby contracts to pay for the same, according to the said contract documents, including the schedule of estimated quantities, and unit and lump sum prices in the Bid Proposal, the approximate sum of \$ \_\_\_\_\_, the total amount of bid, subject to the actual quantity of work performed, at the time and in the manner and upon the conditions provided for in this contract.
3. The Contractor for himself, and for his agents, successors, assigns, subcontractors and/or employees, does hereby agree to the full performance of all the covenants herein contained upon the part of the Contractor.
4. The Owner hereby appoints and the Contractor hereby accepts Wilson Engineering, Inc., hereinafter referred to as the Engineer, as the City's representative for the purpose of administering the provisions of this Contract, including the Owner's right to receive and act on all reports and documents related to this Contract, to request and receive additional information from the Contractor, to assess the general performance of the Contractor under this Contract, to determine if the contracted services are being performed in accordance with Federal, State or local laws, and to administer any other right granted to the Owner under this Contract. The Owner expressly reserves the right to terminate this Contract as provided in the contract documents, and also expressly reserves the right to commence civil action for the enforcement of this contract.





## CONTRACT

5. This Contract contains terms and conditions agreed upon by the parties. The parties agree that there are no other understandings, oral or otherwise, regarding the subject matter of this Contract.
6. The Contractor agrees to comply with all applicable Federal, State, City or municipal standards for the licensing, certification, operation of facilities and programs, and accreditation and licensing of individuals.
7. The Contractor shall not assign or subcontract any portion of the work provided for under the terms of this Contract without obtaining prior written approval of the Engineer. All terms and conditions of this Contract shall apply to any approved subcontract or assignment related to this Contract.
8. The parties intend that an independent Contractor-Owner relationship will be created by this Contract. The Owner is interested only in the results to be achieved, the implementation of the work will lie solely with the Contractor. The Contractor will be solely and entirely responsible for its acts and for the acts of its agents, employees, servants, subcontractors, or otherwise during the performance of this Contract. In the performance of the work herein contemplated, the Contractor is an independent Contractor with regard to the performance of the details of the work; however, the components of and the results of the work contemplated herein must meet the approval of the Engineer and shall be subject to the Engineer's general rights of inspection and review to secure the satisfactory completion thereof.
9. The Contractor agrees and covenants to indemnify, defend, and save harmless, the Owner and the City of Ferndale and those persons who were, now are, or shall be duly elected or appointed officials or members of employees thereof, hereinafter referred to as the "Owner" or "City" against and from any loss, damage, costs, charge, expense, liability, claims, demands or judgments, of whatsoever kind or nature, whether to persons or to property, arising wholly or partially out of any act, action, neglect, omission, or default on the part of the Contractor, his agents, successors, assignees, subcontractors and/or employees, except only such injury or damage as shall have been caused by or resulted from the sole negligence of the City. In case any suit or cause of action shall be brought against the Owner or the City on account of any act, action, neglect, omission, or default on the part of the Contractor, his agents, successors, assignees, subcontractors and/or employees the Contractor hereby agrees and covenants to assume the defense thereof and to pay any and all costs, charges, attorney's fees and other expenses and any and all judgments that may be incurred or obtained against the City.

In the event the Owner is required to institute legal action and/or participate in the legal action to enforce this Indemnification and Hold Harmless Clause, the Contractor agrees to pay the Owner or City's legal fees, costs and disbursements incurred in establishing the right to indemnification.



## CONTRACT

If the claim, suit, or action for injuries, death, or damages as provided for in the preceding paragraphs of this specification is caused by or results from the concurrent negligence of (a) the indemnitee or the indemnitee's agents or employees and (b) the indemnitor or the indemnitor's agents for employees the indemnity provisions provided for in the preceding paragraphs of this specification shall be valid and enforceable only to the extent of the indemnitor's negligence.

Contractor hereby specifically and expressly waives any immunity under Industrial Insurance, Title 51 RCW and acknowledges that this waiver was mutually negotiated by the parties herein. In the event of litigation between the parties to enforce the rights under this paragraph, reasonable attorney's fees shall be allowed to the prevailing party.

10. This Contract has been and shall be construed as having been made and delivered within the State of Washington, and it is mutually understood and agreed by each party hereto that this Contract shall be governed by the laws of the State of Washington, both as to interpretation and performance. Any action in law, suit and equity or judicial proceedings for the enforcement of this contract, or any provisions thereof, shall be instituted and maintained in the courts of competent jurisdiction located in City of Ferndale, Washington.
11. The failure of the Owner to insist upon strict performance of any of the covenants and agreements of this Contract or to exercise any option herein conferred in any one or more instances shall not be construed to be a waiver or relinquishment of any such, or any other covenants or agreements, but the same shall be and remain in full force and effect.
12. It is understood and agreed by the parties hereto that if any part of this agreement is determined to be illegal, the validity of the remaining portions shall be construed as if the agreement did not contain the particular illegal part.
13. No change or addition to this Contract shall be valid or binding upon either party unless such change or addition shall be in writing, executed by both parties.
14. In the event that funding from State, Federal, or other sources is withdrawn, reduced, or limited in any way after the effective date of this Agreement, and prior to its normal completion, the Owner may summarily terminate this Agreement as to the funds withdrawn, reduced, or limited notwithstanding any other termination provisions of this Agreement. If the level of funding withdrawn, reduced or limited is so great that the Owner deems that the continuation of the programs covered by this Agreement is no longer in the best interest of the City, the Owner may summarily terminate this Agreement in whole notwithstanding any other termination of this Agreement. Termination under this section shall be effective upon receipt of written notice as specified herein.

IN WITNESS WHEREOF, the Contractor has executed this instrument, on the day and year first below written and the Owner has caused this instrument to be executed by and in the name of the said County, the day and year first above written.

Executed by the Contractor this \_\_\_\_\_ day of \_\_\_\_\_, 2016.



# CONTRACT

## CITY OF FERNDALE:

By: \_\_\_\_\_  
City Administrator / Mayor

STATE OF WASHINGTON )  
 ) ss.  
COUNTY OF WHATCOM )

On this \_\_\_\_\_ day of \_\_\_\_\_, 2016, before me personally appeared \_\_\_\_\_ to me personally known to be the person described in and who executed the above instrument and who acknowledged to me the act of signing thereof.

NOTARY PUBLIC, in and for the  
State of Washington, residing at:

\_\_\_\_\_  
My Commission Expires: \_\_\_\_\_

## CONTRACTOR:

By: \_\_\_\_\_  
Title: \_\_\_\_\_

STATE OF WASHINGTON )  
 ) ss.  
COUNTY OF WHATCOM )

On this \_\_\_\_\_ day of \_\_\_\_\_, 2016, before me personally appeared \_\_\_\_\_ to me personally known to be the person described in and who executed the above instrument and who acknowledged to me the act of signing thereof.

\_\_\_\_\_  
NOTARY PUBLIC, in and for the  
State of Washington, residing at:

\_\_\_\_\_  
My Commission Expires: \_\_\_\_\_



# PERFORMANCE BOND

## PERFORMANCE BOND

to the  
City of Ferndale

**KNOW ALL MEN BY THESE PRESENTS**, That we \_\_\_\_\_ the Contractor named in the Contract hereinafter referred to as PRINCIPAL, and \_\_\_\_\_ as SURETY, are jointly and severally held and firmly bound to the City of Ferndale, hereinafter referred to as OWNER named in said Contract Pump Stations #2 & #3 Upgrades, Ferndale, Washington, for the penal sum of,

\_\_\_\_\_ DOLLARS  
(\$ \_\_\_\_\_),  
lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, 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 contract with the Owner, dated the \_\_\_\_\_ day of \_\_\_\_\_, 2016, for such construction work with the City of Ferndale, Washington.

**NOW, THEREFORE**, if the Principal shall well, 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 extensions thereof that may be granted by the Owner, with or without notices 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, shall indemnify and save harmless owner from all cost and damage by reason of the principal's default of 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.

**IN WITNESS WHEREOF**, the above bonded parties have executed this instrument under their separate seals this \_\_\_\_\_ day of \_\_\_\_\_, 2016, 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.





**PERFORMANCE BOND**

Corporate Seal:

\_\_\_\_\_  
PRINCIPAL

ATTEST: (If Corporation)

By:\_\_\_\_\_

Title:\_\_\_\_\_

Corporate Seal:

\_\_\_\_\_  
SURETY

By:\_\_\_\_\_

Title:\_\_\_\_\_



# PAYMENT BOND

## PAYMENT BOND to the City of Ferndale

**KNOW ALL MEN BY THESE PRESENTS: that**

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter called Principal,  
(Corporation, Partnership or Individual)

and \_\_\_\_\_  
(Name of Surety)

\_\_\_\_\_  
(Address of surety)

hereinafter called **SURETY**, are held and firmly bound unto \_\_\_\_\_

\_\_\_\_\_  
(Name of Owner)

\_\_\_\_\_  
(Address of Owner)

hereinafter called **OWNER**, in the penal sum of \_\_\_\_\_ Dollars, \$(\_\_\_\_\_)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, 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 **OWNER**, dated the \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_, a copy of which is hereto attached and made a part hereof for the construction of:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**NOW, THEREFORE**, if the Principal shall promptly make payment to all persons, firms, **SUBCONTRACTORS**, and corporations furnishing materials for or performing labor in the prosecution of the **WORK** provided for in such contract, and any authorized extension or modification thereof including all amounts due for materials, lubricants, oil, gasoline, coal, and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such **WORK**, and all Insurance premiums on said **WORK**, and for all labor, performed in such **WORK** whether by **SUBCONTRACTOR** or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.



## PAYMENT BOND

**PROVIDED, FURTHER**, that the said **SURETY** for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the **WORK** to be performed thereunder or the **SPECIFICATIONS** accompanying the same shall in any wise affect its obligation on this **BOND**, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the **WORK** or to the **SPECIFICATIONS**.

**PROVIDED, FURTHER**, that no final settlement between the **OWNER** and the **CONTRACTOR** shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

**IN WITNESS WHEREOF**, this instrument is executed in \_\_\_\_\_ counterparts, each one of which  
(number)

shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_

**ATTEST:**

\_\_\_\_\_  
Principal  
\_\_\_\_\_  
(Principal) Secretary

(SEAL) By \_\_\_\_\_(s)  
\_\_\_\_\_  
(Address)  
\_\_\_\_\_

\_\_\_\_\_  
Witness as to Principal  
\_\_\_\_\_  
(Address)  
\_\_\_\_\_  
(Surety)

**ATTEST:** By \_\_\_\_\_  
(Attorney –in-Fact)

\_\_\_\_\_  
Witness as to Surety  
(Address)  
\_\_\_\_\_  
(Address)

**NOTE:** Date of **BOND** must not be prior to date of Contract.  
If **CONTRACTOR** is Partnership, all partners should execute **BOND**.

**IMPORTANT:** Surety companies executing **BONDS** must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the **PROJECT** is located.



# RETAINAGE INVESTMENT OPTION

## CITY OF FERNDALE

### RETAINAGE INVESTMENT OPTION

CONTRACTOR: \_\_\_\_\_

PROJECT NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

Pursuant to Chapter 60.28 RCW, you may choose how your retainage under this contract will be held and invested. Please complete and sign this form indicating your preference. If you fail to do so, the City of Ferndale (City) will hold your retainage as described in "Current Expense", option 1 below.

- \_\_\_\_\_ 1. Current Expense: The City will retain your money in its Current Expense Fund Account until thirty days following final acceptance of the improvement or work as completed. You will not receive interest earned on this money.
- \_\_\_\_\_ 2. Interest Bearing Account: The City will deposit retainage checks in an interest-bearing account in a bank, mutual savings bank, or savings and loan association, not subject to withdrawal until after the final acceptance of the improvement or work as completed or until agreed to by both parties. Interest on the account will be paid to you.

**BONDS AND SECURITIES ACCEPTABLE BY THE CITY OF FERNDALE:**

1. Bills, certificates, notes or bonds of the United States.
2. Other obligations of the United States or its agencies.
3. Indebtedness of the Federal national Mortgage Association.
4. Time Deposits in commercial banks.

Designate below the type of investment selected:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- \_\_\_\_\_ 3. Bond-in-Lieu: With the consent of the City, the contractor may submit a bond for all or any portion of the amount of funds retained by the City in a form acceptable to the City and from a bonding company meeting standards established by the City, if any. Unless otherwise indicated, the contractor elects to submit a bond for the entire 5% retainage amount. Such bond and any proceeds there from shall be made subject to all claims and liens and in the same manner and priority as set forth for retained percentages in Chapter 60.28 RCW. Whenever the City accepts a bond-in-lieu of retained funds from a contractor, the contractor shall accept like bonds from any subcontractors or suppliers from which the contractor has retained funds. The contractor shall then release the funds retained from the subcontractor or supplier, to the subcontractor or supplier, within thirty days of the contractor's receipt of the retained funds from the City.





## RETAINAGE INVESTMENT OPTION

Retainage is normally released 30 - 45 days after final acceptance of work by the City, or following receipt Employment Security / Department of Revenue clearance, whichever takes longer.

---

(Contractor's Signature)

---

Date

Title: \_\_\_\_\_





# PUBLIC WORKS DEPARTMENT

2095 MAIN STREET / P.O. BOX 936

Ferndale, WA 98248

(360) 384-4006

## NOTICE TO PROCEED

DATE \_\_\_\_\_

CONTACT \_\_\_\_\_

CONTRACTOR \_\_\_\_\_

ADDRESS \_\_\_\_\_

ADDRESS \_\_\_\_\_

RE: Notice to Proceed  
Sewer Pump Stations #2 & #3 Upgrades  
City Project No. SS2014-02  
Correspondence No. XXX

Dear CONTACT:

The City of Ferndale has reviewed and approved the contract bond and evidence of insurance for the aforementioned Project. Therefore, the contract has been executed.

This notice shall constitute the Notice to Proceed on the above referenced project. Contract time (\_\_\_ working days) will begin on DATE. The date of completion of all work is \_\_\_\_\_.

If you have comments, questions, or require further information, please do not hesitate to contact me at (360) 685-2377.

Sincerely,

CITY OF FERNDALE

Katy Radder  
Project Manager

CC. file



## **SUPPLEMENTAL CONDITIONS**



## **SUPPLEMENTAL CONDITIONS**

### **SUPPLEMENTAL CONDITIONS**

The following supplementary conditions modify WSDOT Standard Specifications. If there are any conflicts between these Supplemental Conditions and the aforementioned Standard Specifications, these Supplemental Conditions shall take precedence.

1. **DOCUMENTS INCORPORATED BY REFERENCE**

The following documents are incorporated by reference, to include, but not be limited to:

- Specifications
- Proposal
- Drawings
- Contract
- WSDOT Standard Specifications Plans for Road, Bridge and Municipal Construction, 2016 Edition and Standard Plans for Road, Bridge and Municipal Construction, 2016 Edition

2. **CONFLICT AND PRECEDENCE**

In the event of any conflicting provisions or requirements between the component parts of the Contract Documents, the component parts shall take precedence in the following order:

1. Change Orders
2. Contract Form
3. Addenda
4. Permits and requirements from governmental agencies
5. Drawings
6. Supplemental Conditions
7. Technical Specifications
8. Ferndale City Standards
9. WSDOT Standard Drawings & Details
10. WSDOT Standard Specifications

3. **CONTRACT PLANS AND SPECIFICATIONS**

Five (5) sets of Contract Documents, Three (3) sets of 11"x 17" plans, Two (2) sets of 24"x 36" plans, and a CD with Contract Documents and plans in PDF will be furnished to the Contractor free of charge. Additional sets may be purchased at the advertised price per set.

4. **EXAMINATION OF PLANS, SPECIFICATIONS AND SITE OF WORK**

The bidder shall carefully examine the proposed work site (including material sites), and the contract documents. Submittal of a bid shall be conclusive evidence that the bidder has made these examinations and understands all requirements for the performance of the completed work.

The Contractor shall make deductions and conclusions as to the nature of the materials to be excavated, the difficulties which may arise from subsurface conditions, and of doing any other work affected by the subsurface conditions and shall accept full responsibility. The accuracy of information furnished by the Owner and/or Engineer and/or the plans and specifications as to underground structures, foundation conditions, character of soil, position and quantity of surface and ground water, etc., is not guaranteed. Bidders must satisfy

## SUPPLEMENTAL CONDITIONS

themselves by personal examination and by such other means as they desire with respect to actual conditions in regard to existing groundwater or surface structures. Unforeseen conditions shall not constitute a claim for additional payment under the terms of the contract or constitute a basis for cancellation thereof.

The Specifications do not necessarily discuss complete details of construction, work or materials, performance or installation, and do not necessarily cover construction details or other items of work or fixtures of equipment may affect any particular installation. These details must be ascertained by the Contractor and correlated to bring the parts together to a completed whole.

Where alternate methods have not been brought to the Owner's attention, it is assumed that the Contractor has figured the more costly method or methods.

### 5. WORK AND MATERIALS

In addition to the requirements stated in this contract document, the following shall apply:

All work and materials under this contract shall conform to the 2016 Edition of *Standard Specifications for Road, Bridge and Municipal Construction* as prepared by Washington State Department of Transportation (WSDOT) and Washington State Chapter of American Public Works Association (APWA), and according to the instructions and recommendations of the manufacturer of the material concerned. In case of a conflict between any of the above referenced Standards, the more stringent shall apply.

References throughout the above mentioned Standard Specifications to "State" or "Owner" shall refer to the City of Ferndale.

### 6. OMISSIONS AND DISCREPANCIES

Upon receipt of Award of Contract, the Contractor shall carefully study and compare all drawings, specifications and other instructions and shall, prior to ordering material or performing work, report in writing to the Owner any error, inconsistency or omission not discovered at the pre-bid meeting. If during the accomplishment of the work, a discrepancy is found between the drawings and the physical condition of the locality, it shall be the Contractor's duty to inform the Owner in writing, and the Owner shall promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk.

Minor items of work or material 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 the original bid.

### 7. SURVEYS, PERMITS, REGULATIONS

The Engineer shall provide construction staking for the project. The Contractor shall provide a minimum of 3 day notice for required construction staking. The Engineer has established horizontal references and vertical grade datum for the Contractor's use. The Contractor shall be responsible for protection and preservation of the established reference



## SUPPLEMENTAL CONDITIONS

points. Re-establishing the horizontal and vertical control will be done at the expense of the Contractor by Owner's surveyors.

The bidder shall be familiar with all Federal, State, and local requirements that affect the completion of work in any way (such as laws, ordinances, or rules affecting employees, subcontractors, materials, equipment or procedures). In addition, the Contractor must comply with the following Washington State Laws, including without limitation: Chapter 60.28 RCW (retainage); 39.08 RCW (bond requirements); 18.27 RCW (contractor registration); 35.22.650 RCW (equal opportunity); and 70.92 RCW (handicapped). The Owner will not consider any plea of misunderstanding or ignorance of such requirements.

The Owner will assist with coordinating City permit applications, if needed. The Contractor is to pick up the Land Disturbance permit from the City and fill-out remaining information required, prior to mobilization. However, the Contractor will be responsible for providing submittal information, as needed (including shop drawing, mechanical, and plumbing information) to the Engineer/City (if requested). Temporary permits, easements, and other Non-City permits shall be acquired by the Contractor (if needed).

### 8. EXISTING UTILITIES

The location of all existing utilities shown on the plans is per the best available information, and is therefore approximate only. The Owner/Engineer does not guarantee the accuracy of this information. The contractor shall take whatever measures deemed necessary to verify the accuracy of this information and the cost of such shall be incidental to the bid.

Forty-eight (48) hours prior to starting construction, the Contractor shall contact the City of Ferndale and Underground Utility Locate (if needed). All costs incurred by the Contractor in complying with the requirements of this Section shall be incidental to the entire project and shall be included in the contract price.

### 9. CONNECTIONS TO EXISTING MAINS (WATER MAINS AND SEWER FORCE MAINS)

Connection to existing mains is the full responsibility of the Contractor. Temporary routing of existing pipelines or services, shoring, temporary thrust blocks, extra fittings required to route the pipe over or under existing or new pipe or other utilities and all other work and materials required for making complete, permanent and workable connections are incidental to other items of work.

The Contractor shall be responsible for determining which residents will be affected by shutoffs, and will notify them in writing (with a copy provided to the City) 24 hours in advance. In addition, the Contractor shall notify private property owners or tenants, by having a representative of the Contractor personally contact the private property owner or tenant. If the property owner or tenant is not available, the Contractor shall leave a door hanger notice indicating the commencement date of work, duration of work, the type of work being done, and the Contractor's and Engineer's phone number and address for questions and concerns. The Engineer shall be provided adequate time to review, comment, and approve the door hanger notice prior to the Contractor placing any notices.

## SUPPLEMENTAL CONDITIONS

The Contractor shall locate and verify the type of pipe, size and depth prior to making the connection. Detailed sketches and plans of the connection proposed by the Contractor shall be given to the Engineer not less than one week prior to the expected construction. The City of Ferndale shall be notified not less than two (2) working days prior to connection to existing mains.

### 10. SUBSURFACE CONDITIONS

The CONTRACTOR shall make deductions and conclusions as to the nature of the materials to be excavated, the difficulties which may arise from subsurface conditions, and of doing any other work affected by the subsurface conditions and shall accept full responsibility. The accuracy of information furnished by the OWNER and/or ENGINEER and/or the plans and specifications as to underground structures, foundation conditions, character of soil, position and quantity of surface and ground water, etc., is not guaranteed. Bidders must satisfy themselves by personal examination and by such other means as they desire with respect to actual conditions in regard to existing groundwater or subsurface structures. Unforeseen conditions shall not constitute a claim for additional payment under the terms of the contract or constitute a basis for cancellation thereof.

PLAN AND PROCEDURES FOR THE UNANTICIPATED DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS - The following **Inadvertent Discovery Plan (IDP)** outlines procedures to follow, in accordance with state and federal laws, if archaeological materials or human remains are discovered.

Recognizing Cultural Resources: A cultural resource discovery could be prehistoric or historic. Examples include:

- An accumulation of shell, burned rocks, or other food related materials,
- Bones or small pieces of bone,
- An area of charcoal or very dark stained soil with artifacts,
- Stone tools or waste flakes (i.e. an arrowhead, or stone chips),
- Clusters of tin cans or bottles, logging or agricultural equipment that appears to be older than 50 years,
- Buried railroad tracks, decking, or other industrial materials.

When in doubt, assume the material is a cultural resource.

#### On-Site Responsibilities:

**STEP 1: STOP WORK.** If any City employee, Contractor or Subcontractor believes that he or she has uncovered a cultural resource at any point in the project, all work adjacent to the discovery must stop. The discovery location should be secured at all times.

**STEP 2: NOTIFY CITY PROJECT MANAGEMENT TEAM AND CR/ENV/NR CONTACTS.** Contact the City Project Manager, Wilson Engineering LLC, and Drayton Archaeological Research.

#### Contacts:

#### City Project Manager:

## SUPPLEMENTAL CONDITIONS

Name: Katy Radder  
Phone: (360) 685-2377  
Email:  
KatyRadder@cityofferndale.org

Wilson Engineering LLC  
Name: Jeff Christner, P.E.  
Phone: (360) 733-6100 ex 252  
Email: jgc@wilsonengineering.com

Cultural/Environmental/Natural  
(CR/ENV/NR) Program Manager:  
Name: Garth Baldwin, Drayton  
Archaeological Research  
Phone: (360) 739-3921  
Email:  
garth@draytonarchaeology.com

The Project Manager or the CR/ENV/NR will make all other calls and notifications.

**If human remains are encountered**, treat them with dignity and respect at all times. Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection in place and to shield them from being photographed. **Call the Ferndale Police Department at 360-384-3390** (Do not call 911 or speak with the media).

11. TRAFFIC CONTROL

Traffic shall be maintained in accordance with WSDOT Section 1-07.23 of the WSDOT Standard Specifications and Manual of Uniform Traffic Control Devices. The Contractor shall not close any roadway without first obtaining authorization from the city. The cost for all necessary traffic control by the Contractor shall be incidental to the entire project and shall be included in the contract price.

12. SUBCONTRACTING

The Contractor shall perform work amounting to a minimum of 50% percent of the Awarded Contract Price using his own personnel and equipment. All subcontracting shall be in conformance with WSDOT Section 1-08.1 of the WSDOT Standard Specifications.

13. PRE-CONSTRUCTION CONFERENCE

A Pre-Construction conference shall be held at a time and place fixed by the Owner which will be within two weeks from the date of notification of award of contract. At a minimum the Contractor's project manager and field superintendent are required to attend. Sub-contractors, suppliers and others interested are encouraged to attend.

14. HOURS OF WORK

The Contractor shall schedule operations so that the work will be performed during the hours of 7AM to 5PM Monday through Friday, excluding holidays. A normal 40 hour Monday through Friday work week (4 – 10hr or 5 – 8hr days) is intended. The Contractor shall compensate the City \$80 per hour for each hour over 40 hours per week worked to pay for additional inspection time. The Contractor shall obtain prior approval from the City for overtime hours and schedules.

## SUPPLEMENTAL CONDITIONS

15. COMPLETION DATE

The contracted work is to be completed by no later than **November 30<sup>th</sup>, 2016**. The Contractor will be limited to **126 calendar days (18 weeks)** on-site work. The Contractor shall plan accordingly to meet this completion requirement.

16. SCHEDULE OF CONSTRUCTION & VALUES

Within 10 working days of receiving the notice to proceed, the contractor shall furnish to the City a Schedule of Values. In addition, the Contractor shall furnish a Schedule of Construction at the Pre-Construction Meeting. The Schedule shall identify the project start and finish dates with a detailed breakdown of the proposed order of work and completion dates for major phases of the work. The schedule shall be developed by a critical path method. Time required for testing, backfiring, inspections, ordering, punch lists, etc. shall be incorporated into the schedule (although they do not necessarily need to be specifically identified).

17. RETAINAGE

The owner will deduct from the partial pay estimate a retainage of five percent (5%). Upon completion of all work, specified training, final inspection, and acceptance by Owner, the amount retained under the Contract will be paid within thirty (30) days following final acceptance by Owner and receipt by the Owner of the following:

- State Department of Labor and Industries Release
- Washington State Department of Revenue Release
- Washington State Employment Security Department Release
- Contractor and Subcontractors Affidavit of Wages Paid

The retainage will not be released if any claim has been filed on the project.

18. LIQUIDATED DAMAGES

Liquidated damages will be assessed in accordance with WSDOT 1-08.9 for each working day beyond the Contracted completion date listed above.

19. PHYSICAL COMPLETION FOR THE PUMP STATION UPGRADE

Substantial completion of the Pump station Upgrade shall be defined as follows, with no exceptions:

Each upgraded pump station shall be able to be put to beneficial use. This shall include installation of the new sewer force main piping, pumps, interior piping, valves & supports, completion of all upgrades to the building structure, motor room, pump room, wet well access room, and wet well. Installation of the new generator, propane tank, site improvements, controls, SCADA adjustments, misc. work items, and most of the clean-up complete. In essence, the entirety of each pump station facility will be operable and complete per WSDOT 1-01.3 Completion Dates.

20. PAYMENT TO CONTRACTOR

At least five (5) working days before the end of the month, the Contractor shall submit to the Engineer an itemized application for payment, supported by receipt or other vouchers,

## SUPPLEMENTAL CONDITIONS

showing payments for materials and labor, payments to sub-contractors, and such other evidence of the Contractor's right to payment as the Engineer may direct. The Owner's progress payment shall be made approximately 30 days after the date of submittal.

The owner will deduct from the partial pay estimate a retainage as defined above. Upon completion of all work, final inspection, and acceptance by Owner, the amount retained under the Contract will be paid at the expiration of the thirty (30) day period following final acceptance by owner provided the following conditions are met:

- A. Releases have been obtained from the State Department of Labor and Industries, the State of Washington Employment Security Department, the Washington State Department of Revenue, and all other departments and agencies having jurisdiction over the activities of the Contractor.
- B. No claims, as provided by law, have been filed against the retained percentage.
- C. Affidavit of Wages Paid is on file with the Owner for the Contractor and all Subcontractors.
- D. All contract work is complete in every respect, including operations and maintenance manuals, as-built drawings, etc.

### 21. INDEMNIFICATION

The Contractor agrees to protect, indemnify, and hold harmless the Owner, Engineer and their employees, agents, and staff, from any and all claims, liabilities, damages, expenses, or rights of action, directly or indirectly attributable to the Contractor's activities in connection with this contract, except for the sole negligence of the Owner or Engineer as outlined in Section WSDOT 1-07.14.

### 22. RECORD DRAWINGS

Before receiving payment for more than 90% of the work or declaring physical completion of the work, the Contractor will provide the Owner with accurate record information of all construction activity for the entire project (red line drawing on a full size print). This red line drawing shall include, but not be limited to, any changes to the project and the exact location of all constructed utilities and any other existing utilities discovered during construction that are not identified on existing record information. The red line drawing shall be based on accurate field measurements tied to project benchmarks. The Owner will use this information to prepare Record Drawings. The cost for furnishing this record information shall be considered incidental to the entire project and shall be included in the contract price.

### 23. BARRIER REQUIREMENTS

During construction, the Contractor shall at all times maintain satisfactory and substantial temporary fencing, railing, barricades or steel plates at all openings, obstructions or other hazards. All such barriers shall have warning signs or lights as necessary for safety. Safe access to and protection of the construction site and the Contractor's records shall be maintained at all times.

## **SUPPLEMENTAL CONDITIONS**

### **24. CONTROL OF WORK**

The presence or absence of an Inspector at the job site will be at the sole discretion of the Owner and such presence, or absence, of an Inspector will not relieve the Contractor of his responsibility to obtain the construction results specified in the Contract Documents. The Owner, inspector and engineer do not purport to be Safety Engineers and are not engaged in that capacity and shall have neither authority nor responsibility to enforce construction safety laws, rules, regulations, procedures or the safety of persons on and about the construction site. Any personal assistance which an Inspector may give the Contractor will not be construed as the basis of any assumption of responsibility in any manner, financial or otherwise, by the Owner, Inspector, or the Engineer. The Inspector is on site to insure the project is completed in accordance with all plans and specification, to insure the Owner is getting what is required. He is not there to do the Contractor's scheduling or contact his subs or deliver messages.

### **25. BLASTING**

Blasting is not anticipated and will not be permitted without expressed written consent of the Owner. If blasting is permitted, contractor is responsible for obtaining all necessary permits and insurance.

### **26. INSURANCE**

The Contractor shall take out and maintain during the life of this contract Public Liability Insurance for bodily injury and property damage liability including without limitation, coverage for explosion, blasting, collapse and destruction of underground utilities (X.C.U.) and contingent liability, including products and completed operations and blanket contractual liability, as shall protect the Contractor, the Owner and the Engineer. The Contractor shall have the Owner and the Engineer specifically added as additional named insured in said policies (on Form B), all at no cost to the Owner or the Engineer. The above insurance shall cover the Owner, the Engineer, Contractor and Subcontractors for claims or damages for bodily injury, including wrongful death, as well as other claims for property damage which may arise from operations under this contract whether such operations be by themselves or by any subcontractor or anyone directly or indirectly employed by either of them. The Contractor agrees, in addition, to indemnify and save harmless the Owner and Engineer, either or both, from all suits, claims, demands, judgements, and attorneys fees, expenses or losses occasioned by the performance of this Contract by the Contractor or Subcontractor or persons working directly or indirectly for the Contractor or Subcontractor, or on account of or in consequence of any act or omission of any such person, including but not limited to neglect in safeguarding the work, or failure to conform with the safety standards for construction work adopted by the Safety Division of the Department of Labor and Industry of the State of Washington.

The amount of such insurance shall be as follows:

Bodily injury liability insurance in an amount not less than \$1,000,000.00 for injuries, including wrongful death, to any one person and subject to the same limit for each person, in an amount not less than \$2,000,000.00 on account of any one occurrence, and property damage liability insurance in an amount not less than \$1,000,000.00 for each occurrence. Builders Risk (All Risk Insurance) coverage equal to project bid amount.

## SUPPLEMENTAL CONDITIONS

The Contractor shall not cause any policy to be canceled or permit it to lapse, and all policies shall include a clause to the effect that the policy or certificate shall not be subject to cancellation or to a reduction in the required limits of liability or amounts of insurance or any other material change until notice has been mailed to the Engineer and Owner stating when, not less than thirty (30) days thereafter, such cancellation or reduction or change shall be effective. In the event notice of cancellation is received by the Owner, the Contractor shall immediately obtain other comparable insurance acceptable to the Owner and provide proof thereof to the Owner. In the event the Contractor is unable to obtain and provide such insurance, the Contractor shall immediately cease all work on the project, save and except that which is necessary to secure the site and prevent injury.

All certificates of insurance, authenticated by the proper officer of the insurer, shall state in particular those insured, the extent of the insurance, the location and operations to which the insurance applies, the expiration date, and the above-mentioned notice of cancellation clause.

Provided, however, the Owner may accept insurance covering a Subcontractor in character and amounts less than the standard requirements set forth under this subsection where such standard requirements appear excessive because of the character or extent of the work to be performed by such subcontractor.

A Certificate of Insurance evidencing coverage and a copy of the endorsement naming the Owner and Engineer as additional insured must be submitted to the Engineer prior to the commencement of the Contract in accordance with WSDOT Section 1-03.3.

The following endorsement for additional insured shall be included in all applicable policies and on the Certificate of Insurance:

The Owner and Engineer are additional named insured for all coverages provided by the policy of insurance and shall be fully and completely protected from all claims and risks by this policy and for any and every injury, death, damage, and/or loss of any sort whatsoever, including consequential damages, sustained by any person, organization or corporation in connection with any activity performed by the Contractor or any subcontractors or by anyone directly or indirectly by virtue of the provisions of that contract between the (Owner name), as Owner and (Contractor's name), entitled (Project Title), dated (date).

The coverages provided by this policy to the Owner or any other named insured shall not be terminated, reduced, or otherwise modified in any respect without providing at least 30 days prior written notice by certified mail to the Owner and other additional named insured. The coverages provided by this policy are primary to any insurance maintained by the Owner.

### 27. CHANGES

The Owner reserves the right to make changes in the work within the general scope of the Contract Documents at any time during the progress of the work. The Contractor shall perform all work in accordance with the changes specified by the Owner.

## SUPPLEMENTAL CONDITIONS

Changes required by the Owner may include but are not limited to:

- (a) Deletion of any portion of the work.
- (b) Increases or decreases in quantities.
- (c) Changes in specifications and/or designs.
- (d) Method or manner of performance of the work.
- (e) Addition of any new work.
- (f) Acceleration or delay in the performance of the work.

The Owner shall have the option of paying for such changes by one or more of the following methods:

- (1) by the lump sum or unit contract prices set forth in the Proposal;
- (2) by equitable adjustment mutually agreed upon by the Contractor and the Owner; or
- (3) by Force Account in accordance with WSDOT Section 1-09.6

In the case that the Contractor and the Owner are unable to agree on the amount of equitable adjustment, the Owner will unilaterally determine the amount to be paid for the change in accordance with WSDOT Section 1-09.4. The Owner's decision concerning such amount to be paid shall be final as provided in WSDOT Section 1-05.1.

Any and all administrative costs associated with change orders shall be considered to be part of the Contractor's overhead for the work as bid and not a direct cost of the change. Such administrative costs shall include, but not be limited to, costs of defining changed work, determining estimated cost of changed work, preparing proposals for change orders and negotiation of the method and amount of compensation for changed work.

The compensation for each change shall include all direct and indirect costs including, but not limited to, costs of impacts on related and indirect operations and of delay or acceleration of other work resulting from the change. Failure of the Contractor to identify all direct and indirect costs at the time of negotiation of compensation for each changed shall preclude subsequent claim, after formal execution of a change order, by the Contractor for any additional costs associated with the change.

No payment for extra work or any other change in the contract will be made unless the extra work or change has been authorized by the Owner prior to start of the extra work by the Contractor.

For (a) Deletion of any portion of the work, above, the following requirements shall apply:

No payment will be made for items which are deleted from the contract and not performed. No payment will be made for any anticipated profits which would have been earned on work deleted. Payment for costs incurred by the Contractor prior to the deletion of the work shall include and be limited to actual documented costs of field



## **SUPPLEMENTAL CONDITIONS**

labor, equipment and materials and shall not cover and include overhead as defined in WSDOT Section 1-09.6.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of cancellation of the work will be either purchased from the Contractor by the Owner at the actual cost and shall become property of the Owner or the Owner will reimburse the Contractor for his actual costs connected with returning these materials to the suppliers.

For (b) Increases or decreases in quantities, above, the following requirements apply:

Payment for all bid items shall be at the unit prices bid, regardless of the actual final quantities of the bid items incorporated into the work and regardless of any increase or decrease from the quantities designated in the Schedule of Contract Prices.

No extra or additional payment will be made for any increase in quantity of any bid item. No extra or additional payment will be made for any decrease in quantity of any bid item. No payment will be made for any anticipated profits which would have been earned on deleted quantities.

For (c) Changes in specifications and/or designs; (d) Addition of any new work; and (e) Acceleration or delay in the performance of the work above, the following requirements shall apply:

If the Engineer determines that the above changes cause an increase or decrease in the Contractor's cost of performance of that portion of the work associated with the change and/or an increase or decrease in the contract time required for performance of the work, the increase or decrease in compensation and/or contract time will be determined by agreement of the parties.

### **28. INCREASED OR DECREASED QUANTITIES**

The Contractor shall not purchase or place orders for full quantities of materials until the work has advanced to a state permitting the determination of the exact quantities required. The original bid item quantities designated on the Proposal and other estimates of quantities of materials furnished by the Engineer shall be considered as approximate and not indicative of the actual quantities required. The Owner will not be responsible for any materials purchased in excess of actual requirements and will not be responsible for any increased costs or extra expense that the Contractor may have on account or materials or work not being ordered at some earlier date.

### **29. SALES TAX**

The work is within the City of Ferndale. The Contractor shall correctly reference on payments of sales tax to the Washington Department of Revenue Ferndale's tax code.

### **30. GUARANTEES**

Except where special longer warranties are required, the Contractor shall guarantee all materials and workmanship for a period of one year from the date of Substantial Completion of the project.

## **SUPPLEMENTAL CONDITIONS**

Neither final acceptance by the Owner nor partial and final payment nor any provision in the Contract Documents shall relieve the Contractor of responsibility for faulty materials or workmanship.

If, prior to the expiration of one year after the date of the City's acceptance of all work or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents, any work is found to be defective or not in compliance with the Contract Documents, the Contractor shall promptly, without cost to Owner, either correct such work, or, if it has been rejected by Owner, remove and replace it with acceptable work. If the Contractor does not promptly comply with the notification issued by the Owner for correction of defective and/or non-complying work and have the defect completely repaired within 30 calendar days, the Owner may have the work corrected or removed and replaced and all direct and indirect costs of such removal and replacement, including costs of all professional services, shall be paid by Contractor.

The guarantee shall apply to all elements and parts of the work, regardless of knowledge by the Owner, engineer and inspector(s) of defects or deficiencies and regardless of failure of the Owner, Engineer and/or inspector(s) to inform the Contractor of known or suspected defects or deficiencies prior to Substantial Completion of the work by the Owner.

All subcontractor's, manufacturers', and suppliers' warranties and guarantees, express or implied, for any part of the work, materials and equipment shall be deemed obtained and shall be enforced by the Contractor for the benefit of the Owner without the necessity of formal transfer or assignment thereof. Warranties and guarantees by subcontractors, manufacturers, and suppliers shall begin on and extend for one year after the date of Substantial Completion of all work.

All work (including materials and equipment) repaired or replaced in accordance with this Section shall be guaranteed for a period of one year after the date of City's acceptance of the repair/replacement work.

# **TECHNICAL SPECIFICATIONS**



## **SECTION 01010 - SUMMARY OF WORK**

### **PART 1 - GENERAL**

#### **1.01 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The work covered by the Contract Documents consists of furnishing all labor, equipment and materials necessary for the construction of the Pump Station #2 & #3 Upgrades as shown on the plans and specified herein.
- B. Contractor shall furnish all labor, tools, equipment and materials needed. In addition, the Contractor shall provide shoring, bracing, sheeting, cribbing, falsework, pumping, dewatering, drainage, forms, and all material as required or necessary to excavate, backfill, grade, construct, lay, erect, install, test, and clean up the sites.
- C. Pump Station No. 2 – Work shall consist of, in general, the following:
  - 1. Mobilization – Included in mobilization shall be all costs associated with insurance, bonding, securing and developing a construction staging area, and bringing equipment and miscellaneous facilities to the staging area. Mobilization shall be per WSDOT.
  - 2. Trench Safety Excavation (TESC) Provisions - For all trenches exceeding a depth of four feet, all costs for adequate trench safety systems shall be identified as a separate bid item in compliance with Chapter 39.04 RCW. The purpose of this provision is to ensure that the bidder agrees to comply with all relevant trench safety requirements of Chapter 49.17 RCW.
  - 3. Temporary Erosion and Sedimentation Control – Includes all costs associated with determining, developing, and implementing effective erosion and sediment control measures throughout the duration of the project in accordance with the Contract Plan and Specifications and state and local regulations, including but not limited to: quarry spall construction entrances, siltation ponds, silt fencing, straw bales, check dams, and other sediment trapping devices; slope stabilization measures; low-impact construction practices; and project sequencing.
  - 4. Project Schedule – Includes all costs associated with developing and updating the project schedule including all required submittal updates included under the Contract.
  - 5. Demolition – Includes all costs associated with demolition of the following work areas as called for in the specifications and detailed on the drawings. Work includes but is not limited to:
    - a. Mechanical Demolition – Pumps, shafts, guards, supports; piping, valves, pipe supports; overhead monorail & supports; pump room sump pump & piping; misc. wet well hardware (as required for replacement); membrane roof, ventilators, skylights; exhaust fans, ducting, & supports; cut new 3'x3' openings.
    - b. Electrical Demolition – Pump motors, motor control center, service disconnect, automatic transfer switch, dry transformer, panelboard, motor starters, circuit breaker for 100 amp storm water PS #8, generator, natural gas supply, adjacent wall mounted louvers, wall mounted exhaust fan, generator exterior muffler system, fluorescent light fixtures.

## SECTION 01010 - SUMMARY OF WORK

Note: The electrical service at pump station #2 provides power for the 100 amp, 480V, three phase feeder to storm water pump station #8. In addition to providing temporary power to pump station #2, the contractor shall provide temporary power to pump station #8 during construction.

*Maintain and protect recently upgraded PLC control panel and telemetry panel.*

- c. Site Demolition – Sawcutting, catch basin removal, asphalt grinding and pavement removal, removal of bollards, skate rails, grandstand, trash can.
- 6. Mechanical Improvements – Includes all costs associated with procurement and installation of the following work items as called for in the specifications and detailed on the drawings. *Procurement exception includes all material detailed in Specification Section 11100 as pre-purchased by the City.* Work includes but is not limited to:
  - a. Wastewater Pumps, Piping, Valves, Supports – Pumps and pump accessories, intake & discharge elbows, pump mounting plates; piping, fittings, couplings, misc. pipe appurtenances & instrumentation; valves; pipe & equipment supports, wet well ladder, grating.
  - b. Miscellaneous Mechanical Systems Replacement – Exhaust blowers, ducting, & supports; louvers & dampers; unit heater system; sump pump system; air gap water system; hoisting & pump removal equipment and supports.
  - c. Painting & Coating – Pressure washing, sandblasting, painting& coating prep, priming, painting, coating, and all clean-up.
- 7. Electrical & Control Improvements – Includes all costs associated with procurement and installation of the following work items as called for in the specifications and detailed in the drawings. Work includes but is not limited to:
  - a. Power Distribution Equipment – Main service disconnect, automatic transfer switch, 480-120/208V Transformer, panelboards & power distribution, reconnect 100 amp 480V power feeder to storm water PS#8, electrical and controls for sump pump system, trolley hoist system, air gap water system, LED lighting fixtures & battery-backed emergency lighting.
  - b. Standby Power Generator – Generator, generator enclosure, & generator mounting platform; Underground raceway with power feeder and control signals from the generator to the automatic transfer switch; 500-gallon propane tank (Rental) with accompanying supply piping, regulating equipment & mounting platform.
  - c. Motor Control Center with Variable Frequency Drives (VFDs) – VFDs and local HOA control stations.
  - d. Pump Control Telemetry Cabinets & Miscellaneous Alarm Equipment – Existing pump telemetry cabinet to be reused, add I/O ; Replacement of revolving alarm light.

## SECTION 01010 - SUMMARY OF WORK

- e. Flowmeter – Magnetic flowmeter with electrical & remote display.
  - f. Level Control Equipment – Level pressure transducer, mechanical float level control switches.
  - g. Flood Sensor & Operator-in-Trouble Buttons
8. Site & Building Improvements – Includes all costs associated with procurement and installation of the following work items as called for in the specifications and detailed in the drawings. Work includes but is not limited to:
- a. Traffic Control
  - b. Force Main Tie-in Work & Temporary Bypass Pumping System
    - 1. During tie-in operations for the new 12-in force main, the Contractor shall commit to having a 5,000 gallon Pumper (Vactor) Truck on-site for sewage removal purposes. An additional 5,000 gallon Pumper (Vactor) Truck shall be on standby with no more than 1-hour response and arrival time to the site. Prior to tie-in, the Contractor shall drain down the discharge force main to the maximum extent possible by opening the existing check valves in the pump room and allowing the wastewater to drain back into the wet well. To address any residual wastewater in the line, the Contractor shall excavate a pit at the tie-in point and line it with an impermeable membrane to catch the flow. Potential contacts: Vac-Tank Western Services, Inc. 360-354-4339.
    - 2. The temporary bypass pumping system shall consist of pumps, pump controls, valves, suction and discharge piping, fittings, thrust restraint and other miscellaneous equipment required to construction a temporary bypass pumping system from SSMH #1080 to the new bypass port, as shown on the Contract Plans.
    - 3. The system shall consist of a bypass pump; suction and discharge piping, fittings, valves, and thrust restraint, and control floats or pressure transducer for pump operation and high wet well alarming.
    - 4. Bypass pump shall be a dry priming, pump capable of a minimum of 1,440 gpm at 22-ft TDH assuming 8-inch diameter discharge piping. The pump shall be capable of minimum 25-ft static suction lift and able to pass a 3-in diameter spherical solid.
    - 5. A second (redundant) backup bypass pump shall be onsite at all times. This backup pump shall be manifolded in to both the suction and discharge lines of the primary system and able to be brought online immediately in the event of a primary pump failure. The two bypass pumps shall alternate operation daily. All costs associated with activities related to a pump failure shall be the sole responsibility of the Contractor.
    - 6. The Contractor shall be responsible for providing security, as necessary, for the bypass pump system during non-working hours. Applicable security measures may include temporary chain link fencing, onsite personnel during non-working hours, periodic checks

## SECTION 01010 - SUMMARY OF WORK

during the non-working hours to confirm that the system has not be compromised.

7. Contractor shall maintain continuous oversight of bypass pumping operations at all times using either onsite personnel or the implementation of an alarming system with an automatic callout system which informs the Contractor when an alarm is in progress. A backup alarm should be added which connects to the City's existing radio alarm system. The Contractor shall have personnel available for call out during problems or emergencies. Call out personnel shall be familiar and experienced with the bypass system and sufficiently qualified to make necessary repairs or adjustments to ensure the operation performs suitably and backups or overflows occur. Call out personnel shall be available 24-hours per day, 7 days per week and able to respond on-site within 30 minutes of receiving an alarm.
  8. Pump operation shall be automatic based upon either a pressure transducer or float switch. The pump system shall also be equipped with two redundant high level floats and a low level float which are tied to an automatic alarming system.
  9. Contractor shall be responsible for providing all equipment and controls required for a complete bypass pumping system.
  10. 30-days prior to installation of the bypass pumping system, the Contractor shall submit a complete description of the system to be used, including equipment catalog cuts and a diagram of the system. Included in this submittal, the Contractor shall include an emergency spill response plan for the system. Review and approval of both of these submittals is required prior to the station going on bypass.
- c. Sewer Force Main Improvements – trenching, shoring; & backfill, dewatering as necessary; draining and plugging old force main; piping, valves, fittings, and thrust blocking; connection to existing force main at bridge; installation of new force main piping through the station wall; flowmeter vault and piping; bypass port and vault, cleaning and testing.
  - d. Miscellaneous Utility Improvements – Upgrade primary power equipment and meter at station; provide all coordination, trenching & backfill to relocated gas meter; install new propane piping; relocated water meter and provide new service line and RPBFP assembly and enclosure; coordinate for new telephone pedestal and conduit installation; coordinate for fiber optic conduit and handhole installation.
  - e. Building Improvements – Replace roof system, skylights, doors & frames; masonry repairs and patching; removal of abandoned metal supports and appurtenances from interior and exterior masonry walls, remove and replace antenna.
  - f. Miscellaneous Site Improvements – Storm trench and valve installation, paving replacement and overlays, site grading, gate and gate stops; barrier rails; hydroseeding and miscellaneous site cleanup.
9. Project Closeout – Includes all costs associated with performing all closeout



## SECTION 01010 - SUMMARY OF WORK

activities as called for in the specifications and detailed in the drawings. Work includes but is not limited to:

- a. O& M Manuals & Staff Training
- b. Start-up & Testing
- c. Project Closeout Activities – Punchlist, final submittals & releases, warranty documentation, as-builts, & final cleanup.

D. Pump Station No. 3 – Work shall consist of the following:

1. Mobilization – Included in mobilization shall be all costs associated with insurance, bonding, securing and developing a construction staging area, and bringing equipment and miscellaneous facilities to the staging area. Mobilization shall be per WSDOT.
2. Trench Safety Excavation (TESC) Provisions - For all trenches exceeding a depth of four feet, all costs for adequate trench safety systems shall be identified as a separate bid item in compliance with Chapter 39.04 RCW. The purpose of this provision is to ensure that the bidder agrees to comply with all relevant trench safety requirements of Chapter 49.17 RCW.
3. Temporary Erosion and Sedimentation Control – Includes all costs associated with determining, developing, and implementing effective erosion and sediment control measures throughout the duration of the project in accordance with the Contract Plan and Specifications and state and local regulations, including but not limited to: quarry spill construction entrances, siltation ponds, silt fencing, straw bales, check dams, and other sediment trapping devices; slope stabilization measures; low-impact construction practices; and project sequencing.
4. Project Schedule – Includes all costs associated with developing and updating the project schedule including all required submittal updates included under the Contract.
5. Demolition – Includes all costs associated with demolition of the following work areas as called for in the specifications and detailed on the drawings. Work includes but is not limited to:
  - a. Mechanical Demolition – Pumps, shafts, guards, supports; piping, valves, pipe supports; pump room sump pump & piping; misc. wet well hardware (as required for replacement); membrane roof, ventilators, skylights; exhaust fans, ducting, & supports; cut new 3’x3’ openings.
  - b. Electrical Demolition – Pump motors, motor control center, service disconnect, automatic transfer switch, dry transformer, panelboard, motor starters, generator, natural gas supply, adjacent wall mounted louvers, wall mounted exhaust fan, generator exterior muffler system, fluorescent light fixtures. *Maintain and protect recently upgraded PLC control panel and telemetry panel.*
  - c. Site Demolition – Sawcutting, asphalt grinding and pavement removal, removal of bollards.
6. Mechanical Improvements – Includes all costs associated with procurement and installation of the following work items as called for in the specifications and

## SECTION 01010 - SUMMARY OF WORK

detailed on the drawings. *Procurement exception includes all material detailed in Specification Section 11100 as pre-purchased by the City.* Work includes but is not limited to:

- a. Wastewater Pumps, Piping, Valves, Supports – Pumps and pump accessories, intake & discharge elbows, pump mounting plates; piping, fittings, couplings, misc. pipe appurtenances & instrumentation; valves; pipe & equipment supports, wet well ladder, grating.
  - b. Miscellaneous Mechanical Systems Replacement – Exhaust blowers, ducting, & supports; louvers & dampers; unit heater system; sump pump system; air gap water system; hoisting & pump removal equipment and supports.
  - c. Painting & Coating – Pressure washing, sandblasting, painting& coating prep, priming, painting, coating, and all clean-up.
7. Electrical & Control Improvements – Includes all costs associated with procurement and installation of the following work items as called for in the specifications and detailed in the drawings. Work includes but is not limited to:
- a. Power Distribution Equipment – Main service disconnect, automatic transfer switch, 480-120/208V Transformer, panelboards & power distribution, electrical and controls for sump pump system, trolley hoist system, air gap water system, LED lighting fixtures & battery-backed emergency lighting.
  - b. Standby Power Generator – Generator, generator enclosure, & generator mounting platform; Underground raceway with power feeder and control signals from the generator to the automatic transfer switch; 500-gallon propane tank (Rental) with accompanying supply piping, regulating equipment & mounting platform.
  - c. Motor Control Center with Variable Frequency Drives (VFDs) – VFDs and local HOA control stations.
  - d. Pump Control Telemetry Cabinets & Miscellaneous Alarm Equipment – Existing pump telemetry cabinet to be relocated and reused, add I/O ; Replacement of revolving alarm light.
  - e. Flowmeter – Magnetic flowmeter with electrical & remote display.
  - f. Level Control Equipment – Level pressure transducer, mechanical float level control switches.
  - g. Flood Sensor & Operator-in-Trouble Buttons
8. Site & Building Improvements – Includes all costs associated with procurement and installation of the following work items as called for in the specifications and detailed in the drawings. Work includes but is not limited to:
- a. Traffic Control
  - b. Temporary Bypass Pumping System
    1. During tie-in operations for the new 12-in force main, the Contractor shall commit to having a Pumper (Vactor) Truck on-site for sewage

## SECTION 01010 - SUMMARY OF WORK

removal purposes. Prior to tie-in, the Contractor shall drain down the discharge force main to the maximum extent possible by opening the existing check valves in the pump room and allowing the wastewater to drain back into the wet well. To address any residual wastewater in the line, the Contractor shall excavate a pit at the tie-in point and line it with an impermeable membrane to catch the flow. A Pumper (Vactor) Truck shall be onsite during the phase to remove the residual wastewater. Potential contacts: Vac-Tank Western Services, Inc. 360-354-4339.

2. The temporary bypass pumping system shall consist of pumps, pump controls, valves, suction and discharge piping, fittings, thrust restraint and other miscellaneous equipment required to construction a temporary bypass pumping system from SSMH #5090 to the new bypass port, as shown on the Contract Plans.
3. The system shall consist of a bypass pump; suction and discharge piping, fittings, valves, and thrust restraint, and control floats or pressure transducer for pump operation and high wet well alarming.
4. Bypass pump shall be a dry priming pump capable of a minimum of 1,490 gpm at 16-ft TDH assuming 8-inch diameter discharge piping. The pump shall be capable of minimum 25-ft static suction lift and able to pass a 3-in diameter spherical solid.
5. A second (redundant) backup bypass pump shall be onsite at all times. This backup pump shall be manifolded in to both the suction and discharge lines of the primary system and able to be brought online immediately in the event of a primary pump failure. The two bypass pumps shall alternate operation daily. All costs associated with activities related to a pump failure shall be the sole responsibility of the Contractor.
6. The Contractor shall be responsible for providing security, as necessary, for the bypass pump system during non-working hours. Applicable security measures may include temporary chain link fencing, onsite personnel during non-working hours, periodic checks during the non-working hours to confirm that the system has not be compromised.
7. Contractor shall maintain continuous oversight of bypass pumping operations at all times using either onsite personnel or the implementation of an alarming system with an automatic callout system which informs the Contractor when an alarm is in progress. A backup alarm should be added which connects to the City's existing radio alarm system. The Contractor shall have personnel available for call out during problems or emergencies. Call out personnel shall be familiar and experienced with the bypass system and sufficiently qualified to make necessary repairs or adjustments to ensure the operation performs suitably and backups or overflows occur. Call out personnel shall be available 24-hours per day, 7 days per week and able to respond on-site within 30 minutes of receiving an alarm.

## SECTION 01010 - SUMMARY OF WORK

8. Pump operation shall be automatic based upon either a pressure transducer or float switch. The pump system shall also be equipped with two redundant high level floats and a low level float which are tied to an automatic alarming system.
  9. Contractor shall be responsible for providing all equipment and controls required for a complete bypass pumping system.
  10. 30-days prior to installation of the bypass pumping system, the Contractor shall submit a complete description of the system to be used, including equipment catalog cuts and a diagram of the system. Included in this submittal, the Contractor shall include an emergency spill response plan for the system. Review and approval of both of these submittals is required prior to the station going on bypass.
- c. Sewer Force Main Improvements – trenching, shoring; & backfill, dewatering as necessary; draining and plugging old force main; piping, valves, fittings, and thrust blocking; connection to existing force main; installation of new force main piping through the station wall; flowmeter vault and piping; bypass port and vault, cleaning and testing.
  - d. Miscellaneous Utility Improvements – Upgrade primary power equipment and meter at station; provide all coordination, trenching & backfill to relocated gas meter; install new propane piping; relocated water meter and provide new service line and RPBFP assembly and enclosure.
  - e. Building Improvements – Replace roof system, skylights, doors & frames; masonry repairs and patching; removal of abandoned metal supports and appurtenances from interior and exterior masonry walls, remove and replace antenna.
  - f. Miscellaneous Site Improvements – paving replacement, site grading, clean drainage ditch and restore inlet/outlet riprap, weed control, planting shrubs, mulch installation, hydroseeding and miscellaneous site cleanup.
9. Project Closeout – Includes all costs associated with performing all closeout activities as called for in the specifications and detailed in the drawings. Work includes but is not limited to:
    - a. O& M Manuals & Staff Training
    - b. Start-up & Testing
    - c. Project Closeout Activities – Punchlist, final submittals & releases, warranty documentation, as-builts, & final cleanup.

### 1.02 WORK AND RESPONSIBILITIES

- A. Unless otherwise indicated, work and responsibilities include, but are not limited to the following:
  1. Providing and paying for labor, materials, equipment, tools, machines, facilities, and services necessary for execution and completion of work.
  2. Paying required taxes.

## SECTION 01010 - SUMMARY OF WORK

3. Giving required notices.
4. Enforcing strict discipline and good order among employees.
5. Using new materials, except as noted.
6. Maintaining required egress and other requirements in accordance with governing Codes and Ordinances throughout the work.
7. Obtaining and paying for required permits, fees and notices, see General Conditions.

### 1.03 SEQUENCE/PHASING

- A. Contractor shall comply with the sequence of operation shown on the plans or discussed in the specifications. It is anticipated that the new discharge force main piping, flowmeter vaults, and bypass ports at each pump station shall be constructed before setup of the temporary bypass pumping systems. The Contractor will then be able to utilize the new bypass ports in the temporary bypass systems. Only one station will be allowed to be on bypass at a time.
- B. These documents are not to be interpreted implicitly or explicitly as definition of procedure and sequence of operations. Order as to procedure and sequence of operations are Contractor options, consistent with contract documents and as approved by Owner.
- C. Site Work: Proposed stockpiling areas must be approved by the Owner.
- D. Summary: The foregoing outline of the primary elements of construction within the project is intended as a summary of that work only. The work outlined is not to be regarded by the Contractor as an exhaustive definition of the scope of work.

### 1.04 COOPERATION AND COORDINATION

- A. Contractor is responsible for coordinating and scheduling work of subcontractors to expedite progress of the Project.
- B. Subcontractor Instructions: Subcontractors to become familiar with Conditions of the Contract and the work of other Sections related to their own work.
- C. Project Coordination and Scheduling Control: Responsibility for coordination and close adherence to time schedules rests solely with the General Contractor who shall maintain coordination and scheduling control at all times.
- D. Each separate contractor and each subcontractor responsible to the General Contractor shall cooperate diligently with the General Contractor in the execution of their work so as to cause no delay in the completion of the Project. This responsibility includes the completion of all work in a timely manner and all items of equipment connected and fully operating at the time of Substantial Completion. Each separate contractor and each subcontractor shall diligently comply with the following requirements:
  1. Inform other trades of requirements at proper time to prevent delay or revisions.
  2. Be informed on the requirements of other trades and check own work for conflicts with the work of other trades.

## SECTION 01010 - SUMMARY OF WORK

3. Insure delivery of materials and performance of work on coordinated schedule with other trades.
  4. Contractor is to ensure the subcontractors and equipment suppliers are responsible for compatibility and completeness of the installation and operation of the equipment in their respective Specification Sections including conformance with code requirements. If power, piping, conduit, or other work required for complete installation is not provided by others to equipment location or is not adequate for complete installation, the Contractor shall be responsible for providing the necessary connections.
- E. Notification and Correction of Defective Work: Before starting a section of work, each contractor and subcontractor shall carefully examine all preparatory work that has been executed to receive his work. Check carefully, by whatever means required, to ensure that the work and adjacent, related work will finish to proper contours, planes, and levels. Promptly notify the Contractor of any defects or imperfections in preparatory work which will in any way affect satisfactory completion of the work. Under no condition shall a section of work proceed prior to preparatory work having been completed, cured, dried, or otherwise made satisfactory to receive such related work. Correction of defective work or underlying defects shall be the responsibility of the Contractor.
- F. Intent of Drawings: The work of each contractor and subcontractor shall conform to the intent of the contract drawings. Drawings showing work of other trades are partly diagrammatic and do not intend to show in detail all features of work. Each contractor shall carefully review and compare related drawings and shall thoroughly understand the building conditions affecting their work. All changes required in the work caused by failure to do so shall be at no expense to the Owner.
- G. Interferences and Right-Of-Way: Make proper provisions to minimize interferences. Where conflicts occur, gravity drainage improvements have right-of-way over mechanical and electrical work; electrical work has right-of-way over landscaping work. Submit conflicts which cannot be resolved by right-of-way to Engineer for instructions.
- H. Cooperate and coordinate with any other separate Contractors under Contract with the Owner.
- 1.05 CONSTRUCTION STAGING AREA
- A. Coordinate staging areas with the City.
- 1.06 EXISTING UTILITIES
- A. Utilities of record are shown on the Drawings insofar as possible to do so. These, however are shown for convenience only and the Owner and his representatives assume no responsibility for improper locations or failure to show utility locations on the Drawings. At Contractor's expense, immediately repair utilities damaged during construction.
- 1.07 MISCELLANEOUS

## **SECTION 01010 - SUMMARY OF WORK**

- A. Items include, but are not limited to:
1. Contractor to provide on-site access to City crews at all times, in particular for City maintenance activities.
  2. Maintaining a pedestrian and vehicular access to and around existing projects.
  3. Not unreasonably encumbering site with materials or equipment.
  4. Assuming full responsibility for protection and safekeeping of products stored on premises.
  5. Moving any stored products interfering with any other Contractors.
  6. Obtaining and paying for use of additional storage or work areas needed for operations.
  7. Restoration of any damage to existing improvements adjacent to work site.
  8. Moving and replacing items incidental to completion of the work including mailboxes, fences, small shrubs and trees, street signs, yard decorations, etc.

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





## **SECTION 01060 - REGULATORY REQUIREMENTS**

### **PART I - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. As required by General Conditions: "Contractor shall comply with and give notices required by all federal, state, and local laws, ordinances, rules, regulations and lawful orders of public authorities applicable to performance of the Work." Except where otherwise expressly required by applicable Laws and regulations, neither OWNER nor ENGINEER will be responsible for monitoring CONTRACTOR'S compliance with any Laws and Regulations. Contractor is responsible for keeping the Owner, Labor & Industries and other authorities completely informed of any changes in the work in a timely manner, and is responsible for informing them of any changes in the work which may affect codes and laws. This includes contract modifications, amendments, additions, shop drawings, and the like.
- B. Make any and all adjustments and modifications as required to conform to ordinances, and regulations.
- C. Referenced codes establish minimum requirement levels. Where provisions of various codes or standards conflict, the more stringent provisions govern. Promptly submit to Engineer written notice of observed contract document variations from legal requirements.
- D. Compliance requirements include, but are not limited to following:
  - 1. Uniform Building Code and Related Standards, most recent edition, published by the International Conference of Building Officials.
  - 2. State Rules and Regulations for Barrier Free Design/WAC 51-10.
  - 3. The Americans with Disabilities Act (ADA) "Accessibility Guidelines for Buildings and Facilities."
  - 4. Department of Labor and Industries Regulations.
  - 5. Electrical Work:
    - a. Underwriters' Laboratories (UL).
    - b. National Electrical Manufacturers' Association (NEMA).
    - c. NFPA, National Electric Code (NEC), National Electric Safety Code, and above electrical listings, as applicable.
    - d. State Electrical Construction Code.
  - 6. Environmental Requirements: All work to be performed in compliance with relevant statutes and regulations dealing with prevention of environmental pollution and preservation of public natural resources.
  - 7. 2016 Standard Specifications for Road and Bridge Construction, Washington State Department of Transportation, (WSDOT).
  - 8. Standard Specifications for Municipal Public Works Construction, Washington State Chapter, American Public Works Association.

#### **1.02 MISCELLANEOUS EXPLANATIONS/INTENT**

- A. A number of Specified Items Required: Wherever in these Specifications an article, device, or piece of equipment is referred to in the singular number, the reference applies

## SECTION 01060 - REGULATORY REQUIREMENTS

to as many such articles as are shown on the Drawings or required to complete the installation.

- B. Drawings/Diagrammatic:
  - 1. Drawings are in part diagrammatic and do not necessarily show complete details of construction, work or materials, performance or installation. And they do not necessarily show how construction details, other items or work, fixtures, and equipment may affect any particular installation. Contractor is required to ascertain and correlate the work to bring the parts together into a satisfactory and completed whole.
  - 2. Furnish and install work not covered under any heading, Section, branch, class or trade of the Project Manual, but shown on or reasonably inferable from the Drawings. This includes all work necessary to produce the intended results.
- C. Wording of these Specifications: These Specifications are of the abbreviated or streamlined type and may include incomplete sentences.
  - 1. Words such as "shall", "the Contractor shall", "shall be", and similar mandatory phrases, are required to be supplied by inference in the same manner as they are in a note on the Drawings.
  - 2. Provide all items, articles, materials, and operations listed, including all labor, materials, equipment and incidentals, required for their completion.
- D. Tense, Gender, Singular, Plural: Present tense words include future tense. Words in masculine gender include feminine and neuter genders. Words in the singular include plural. Plural words include singular.
- E. All, Entire, and the Like: For brevity throughout the documents, these words may be omitted. Read their implications into all work.
- F. Specifications by Reference: Any material specified by reference or number, symbol or title of a specified standard, such as commercial standard, ANSI and ASTM documents, Federal Specifications, trade association standard, or the like, shall comply with the following:
  - 1. The latest revision requirements thereof, and any amendment or supplement thereto, in effect on Bid date or date of Owner-Contractor Agreement when there are no bids.
- G. Dimensions and Measurements on Drawings: Dimensions govern. Do not scale. Contractor is to check all dimensions in the field and verify them with respect to adjacent or incorporated work. Large scale drawings take precedence over plans, elevations, and cross sections.
- H. First Class Workmanship: First Class Workmanship is expected.
  - 1. Prior to installing any item or material, verify that receiving surfaces are plumb, level, true to line, and straight to the degree necessary to achieve tolerances specified or required. Perform without extra cost all shimmering, blocking, grinding, or patching required to make such surfaces plumb, level, true to line, and straight.

## **SECTION 01060 - REGULATORY REQUIREMENTS**

2. Take care in attention to details and fitting at intersections and junctures of materials. All joints are to be tight, straight, even, and smooth.
- I. Presence of Engineer/Owner: Do not misconstrue presence of this person or any of his representatives at the site as assuring compliance with Contract Documents.

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



## **SECTION 01200 - PROJECT MEETINGS**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. Project meetings will be held to accomplish the following:
  - 1. Coordinate the work of the project and resolve any conflicts or construction problems.
  - 2. Establish a sound working relationship between the Contractor, Owner, and Engineer.
  - 3. Establish sound working procedures.
  - 4. Review job progress and quality of work.
  - 5. Expedite the work to completion within the scheduled time limit.
- B. Representatives of Contractors, subcontractors, and suppliers attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.

#### **1.02 RELATED SECTIONS:**

- A. Related work specified elsewhere:
  - 1. Pre-Bid Conference: Bid Procedures
  - 2. Summary of Work: Instructions to Bidders
  - 3. Section 01300 - Submittals

#### **1.03 PRECONSTRUCTION MEETING**

- A. The pre-construction meeting will be scheduled within the time frame identified in the General Conditions. The Owner will notify the Contractor as to the time and place of the meeting.
- B. Present at the meeting shall be a representative of the Owner, the Engineer, the Contractor, Project Superintendent, and major subcontractors.
- C. The Contractor must be prepared for a thorough discussion and review, as well as revisions which may be deemed necessary in the opinion of the Owner, of the following:
  - 1. General project information
  - 2. Responsibilities of all involved parties
  - 3. Content of the contract
  - 4. Contractor's schedule
  - 5. Schedule of construction
  - 6. Penalties and Liquidated Damages
  - 7. Subcontracts
  - 8. Status of Owner furnished materials
  - 9. Change order procedures
  - 10. Staking of work
  - 11. Project inspection
  - 12. Acceptance of work
  - 13. Labor standards requirements

## SECTION 01200 - PROJECT MEETINGS

14. Rights-of-way and easements
15. Placement of project signs and posters
16. Handling of disputes
17. Schedule of Values
18. Additional issues as required.

### 1.04 PROGRESS MEETINGS

- A. Unless otherwise required, progress meetings will be held by the Owner on a weekly basis at a location near the site. Present at these meetings shall be the Contractor, subcontractors and suppliers as required, the Owner and other interested parties, i.e., material suppliers, public utility, etc.
- B. The Contractor must be prepared for a thorough discussion and review, as well as revisions which may be deemed necessary in the opinion of the Owner, of the following:
  1. Review work since previous meeting.
  2. Make field observations and address any conflicts or problems.
  3. Review material delivery schedules
  4. Review work progress including any issues that may impact project schedule.
  5. Review submittal schedule.
  6. Maintenance, testing and quality standards.
  7. Review any proposed changes.
  8. Review pay requests and procedures.
- C. The Owner shall preside over progress meetings and shall be responsible for taking minutes, recording all significant proceedings and decisions. Copies of minutes shall be distributed within one week after the meeting.

### 1.05 SCHEDULE

- A. The Contractor shall develop and submit an estimated construction progress schedule for the contracted work. The schedule shall be submitted to the Owner at the Pre-Construction Meeting.
- B. Schedule shall be a critical path diagram depicting the first day of each week and sized to be legible and permit notations and future revisions. An updated schedule shall be submitted at each progress meeting or, at a minimum, every two weeks.
- C. Schedule shall be arranged chronologically by the start date of each item, and consider the following:
  1. The estimated construction progress schedule shall:
    - a. Show complete sequence of construction by activity.
    - b. Show start and stop dates of each major construction element.
    - c. Show projected percent completion for each major construction element at the first of each month.
  2. Through construction, the Contractor shall record progress of each major construction element.

## **SECTION 01200 - PROJECT MEETINGS**

3. Revisions shall show changes relative to previously submitted schedules and updated projections of progress and completion.
- D. The schedule and all subsequent revisions shall be kept at the Contractor's field office with copies provided to the Engineer and Owner.

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





## **SECTION 01300 - SUBMITTALS**

### **PART 1 - GENERAL**

#### **1.01 GENERAL SUMMARY**

- A. Related Requirements Specified Elsewhere:
  - 1. Supplemental Conditions: Section 00800
  - 2. Contract Closeout: Section 01700
- B. Description of Section:
  - 1. Summarize, but not necessarily a complete listing, submittals required of the Conditions of the Contract and the General Requirements.
  - 2. General procedures for specification submittals. Specific requirements for submittals are included in the individual sections.

#### **1.02 GENERAL SUBMITTAL REQUIREMENTS**

- A. Identification of Submittals
  - 1. Identify each submittal with Project title and number; clearly define location of submittal in the project and/or its location in the Contract Documents.
  - 2. It is the responsibility of the Contractor to coordinate the work of the various trades involved with the work under this agreement. Contractor shall check all submittals by his subcontractors and mark them with his approval prior to submittal.

#### **1.03 SUBMITTALS - GENERAL**

- A. General

The listing of submittals is given generally as a checklist for the Contractor's convenience. The Engineer reserves the right to add to this list. This list is not an exhaustive listing of applicable laws, provisions of any law, or requirements of these Contract Documents.
- B. With Bid
  - 1. Qualifications of Contractor and subcontractors
  - 2. Bid Bond
  - 3. Completed Bid Form with all unit costs, signed
  - 4. Proposal
- C. With Award
  - 1. As required by financing agency
  - 2. Performance & Payment Bonds
  - 3. Liability Insurance
  - 4. Agreement
- D. 10 Days after Agreement (or earlier)
  - 1. Construction Schedule (to be available at Pre-Construction Meeting also)
  - 2. Schedule of Shop Drawing Submission
- E. Prior to Commencing Work
  - 1. Statement of Intent to Pay Prevailing Wage
  - 2. Final Project Schedule
- F. 2 Weeks Prior to Temporary Bypass Cut-In Work
  - 1. Bypass Cut-In Plan (See 01010 – Summary of Work)
- G. 2 Weeks Prior to Bypass Pump Around Period
  - 1. Bypass Pump Around Plan (See 01010 – Summary of Work)
- H. 2 Weeks Prior to Dewatering Activities

## SECTION 01300 - SUBMITTALS

1. Dewatering Plan (See 02370 – Erosion and Sedimentation Control)
- I. Monthly, After Commencing Construction
  1. Application for Payment
- J. Applications for Payment
  1. Contractor affidavit stating payment of subcontractors
  2. Subcontractor statements of being paid
  3. Paid receipts and inventories of materials stored
  4. Updated Construction Schedule
  5. O & M Manuals prior to application for payment exceeding 90% of Total
- K. Final Application for Payment
  1. Record Drawings information
- L. Release of Retained Funds
  1. Record and related contract closeout documents
  2. Affidavit of Payment (wages, subcontractors, taxes, etc.)

### 1.04 SUBMITTAL OF SHOP DRAWINGS & SAMPLES

- A. General
  1. Refer to the General Provisions. Provide one (1) PDF copy of each submittal.
  2. Submission of shop drawings and samples shall be accompanied by one original and one copy of a transmittal letter containing project name, Contractor's name, number of drawings and samples, titles and other pertinent data.
  3. Contractor shall maintain a complete material list and file of Engineer reviewed submittals at the project site for use as reference by subcontractors, Owner, Engineer and other interested parties.
- B. Shop Drawings
  1. General:
    - a. Shop drawings shall be the same size as the Contract Drawings. A 5" x 5" space shall be provided in the lower right-hand corner of the shop drawings for the review stamp.
    - b. Drawings shall clearly indicated the correct configurations and relative sizes, materials, metal gages, etc. of the various components and the proposed methods of fabrication, required clearances, supports and any other pertinent data.
  2. Submittals:
    - a. Submit PDF copies of each shop drawing for General, Mechanical and Electrical work, including fabrication, erection, layout and setting drawings and other drawings.
    - b. Engineer will review for conformance to design.
    - c. Contractor is responsible for obtaining and distributing required prints of shop drawings to his subcontractors and material suppliers before and after final review by the Engineer.
    - d. Submittals shall be for equipment and materials which meet or exceed the specifications. Submittals shall be, in the sole judgement of the Engineer, acceptable by the second submittal. The Contractor will be responsible for the cost of review, as solely determined by the Engineer, for all reviews

## SECTION 01300 - SUBMITTALS

after the second review. Such costs will be deducted from the Contract Amount.

- C. Samples
  - 1. Form of Submittal:  
When samples are specified to be submitted, furnish two samples, except as noted herein, of sufficient size to indicate general visual effect or as otherwise specified in the specifications, and in as nearly the form in which the material will appear on the project as practicable; i.e., submit paint on samples of actual material for which they are specified as a finish; one set of reviewed and selected samples will be retained at the Engineer's office.
  - 2. Review:
    - a. The Owner will check submitted samples against file samples and project requirements, will make final selection of colors and finishes from samples, and will approve sample for application on the project in conformance with the Specifications.
    - b. Should a submitted sample not be in conformance with the specifications, resubmit sample which conforms with the requirements of Contract Documents.
- D. Catalog Cuts, Data & Brochures
  - 1. Where indicated in the Specifications, catalog cuts and similar data will be accepted in lieu of shop drawings, provided they contain required information and are clearly printed. Submit manufacturer's descriptive data including catalog sheets for materials, equipment and fixtures, showing dimension, performance characteristics and capacities, wiring diagrams and controls, schedules, and other pertinent information as required.
- E. Submittal of Product Certificates
  - 1. Where manufacturer certificates are specified to be furnished attesting to conformance with specification requirements, submit certificates in triplicate prior to acceptance of the Work.
- F. Test Reports
  - 1. Submittal is classified either as "shop drawing" or "product data", depending upon whether the report is uniquely prepared for the project or a standard publication of regular product or workmanship control testing at the point of production (respectively).
  - 2. Refer to individual sections of the Specifications for specific requirements; furnish 3 copies when required.
- G. Warranties
  - 1. Provide warranties, guarantees and/or maintenance agreements where the Specifications require a period longer than the Contractor warranty period.
- H. Operation & Maintenance Data  
Furnish instructions and data on materials and equipment installed in the work in accordance with requirements of the technical provisions of the specifications and

## **SECTION 01300 - SUBMITTALS**

assemble as specified below. These manuals shall be submitted prior to application for payment exceeding 90% of the total contract amount.

1. Provide five (5) sets of Operation and Maintenance Data. Each set shall be bound in separate commercial quality three-ring binders with durable and cleanable plastic covers. The words "Operation and Maintenance Manual (or Instruction)" along with the type of equipment covered shall be typed or neatly printed on the cover.
2. Each set shall be complete with an index and, as a minimum, cover the following items:
  - a. Name, location and telephone number of manufacturer and product's model number.
  - b. Name, location and telephone number of nearest supplier and spare parts warehouse.
  - c. Start-up procedures and normal operating characteristics and instruction.
  - d. Regulation, control, shut-down and emergency instructions.
  - e. Recommended preventative maintenance procedures including a lubrication schedule with recommended lubricants.
  - f. Trouble-shooting guide.
  - g. Complete nomenclature and commercial number of all parts including exploded views of each assembly.
  - h. List of recommended spare parts.
  - i. Complete as-built elementary wiring and outline diagrams.
  - j. Statements of warranty or guarantee.
3. Operation and Maintenance Manuals shall be submitted in at least draft form for Engineer's review with Shop Drawings, Catalog Cuts and other material submittal data. Final drafts, incorporating Engineer's comments, shall be submitted prior to Contractor's application of payment for 90 percent or more of the work.
4. Contractor shall maintain a complete file of all Engineer reviewed Operation and Maintenance Manuals at the project site for use as a reference by interested parties.

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

## **SECTION 01400 - QUALITY CONTROL**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. Inspection and testing laboratory qualifications, duties and responsibilities.
- B. Contractor's quality control requirements.

#### **1.02 RELATED SECTIONS**

- A. Related Requirements Specified Elsewhere:
  - 1. Section 01300 - Submittals
  - 2. Section 01600 - Materials and Equipment
  - 3. Section 01700 - Contract Closeout

#### **1.03 APPLICABLE PUBLICATIONS**

- A. ASTM E329: Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as used in Construction.
- B. WSDOT and ASHTO: Applicable sections that pertain to compaction testing for subgrade, base and top course, and asphalt testing.
- C. Washington State Building Code and Uniform Building Code Standards.

#### **1.04 DEFINITIONS**

- A. Factory Tests: Tests made on various products and component parts prior to shipment to the job site, including but not limited to such items as transformers, boilers, air conditioning equipment, electrical equipment, and precast concrete.
- B. Field Tests: Tests or analyses made at, or in the vicinity of the job site in connection with the actual construction.
- C. Product: The term "product" includes the plural thereof, and means a type or a category of manufactured goods, constructions, installations and natural and processed materials or those associated services whose characterizations, classification or functional performances determination is specified by standards.
- D. Person: The term "person" means associations, companies, corporations, educational institutions, firms, government agencies, at the Federal, State and Local level, partnerships, and societies, as well as divisions thereof, and individuals.
- E. Testing Laboratory: The term "testing laboratory" means and "person", as defined above, whose functions include testing, analyzing, or inspecting "products" as defined above, and/or evaluating the designs or specifications of such "products" according to the requirements of applicable standards.
- F. Certified Test Reports: Certified test reports are reports of tests signed by a qualified professional attesting that tests were performed in accordance with the test method specified, that the test results reported are accurate, and that items tested either meet or fail to meet the stated minimum requirements. These test reports include those performed by Factory Mutual, Underwriter's Laboratories, Inc., and others.

## SECTION 01400 - QUALITY CONTROL

- G. Certified Inspection Reports: Certified inspection reports are those signed by approved inspectors attesting that the items inspected meet the specification requirements other than any exceptions included in the report.
- H. Manufacturer's Certificate of Conformance or Compliance: A certificate signed by an authorized manufacturer's official attesting that the material or equipment delivered meets the specification requirements.

### 1.05 QUALITY CONTROL REQUIREMENTS

- A. All work under the contract shall be inspected and tested as specified herein. The Contractor shall maintain records of all inspections and tests. Approvals shall be obtained before delivery of materials to the project site.
- B. The Contractor is responsible for scheduling and coordinating all field testing (cast-in-place concrete, earthwork/trench compaction, pipe pressure testing, potable pipe disinfection, etc.). The contractor is responsible for notifying Owner and coordinating test requests as discussed elsewhere in these documents. The contractor is responsible for the costs of any repeat tests required where failed test results were obtained.
- C. If required, contractor responsibility for quality control testing shall be as follows:
  - 1. Factory Tests: Unless otherwise specified, the Contractor will arrange and pay for factory tests when required by the contract documents.
  - 2. Factory Inspection: Unless otherwise specified, the Contractor will arrange and pay for factory inspection when required by the contract documents.
  - 3. Field Inspection and Tests by the Contractor: Unless otherwise specified, the Contractor shall furnish all equipment, instruments, qualified personnel, and facilities necessary to inspect all work and perform all tests when required by the contract documents. All inspections and tests performed and test results shall be promptly submitted to the Owner.
  - 4. Approval of Testing Laboratories: All laboratory work under this contract shall be performed by a laboratory approved by the Owner.
- D. Laboratory Reports: Reports shall cite the contract requirements, the test or analysis procedures used, the actual test results, and include a statement that the item tested or analyzed conforms or fails to conform to the specifications requirements. All test reports shall be signed by a representative of the testing laboratory authorized to sign certified test reports. The Contractor shall arrange for immediate and direct delivery of the signed original of all reports, certifications, and other documentation to the Owner.
- E. Repeated Tests and Inspections: The Contractor shall repeat tests and inspections after each failed test until passing test results are obtained. The retesting and reinspections shall be performed at no additional cost to the Owner and the Contractor shall reimburse the Owner for their or their representative's, time and expenses due to the failed test results.

### 1.06 CONTRACTOR'S RESPONSIBILITY

## **SECTION 01400 - QUALITY CONTROL**

- A. Access. Furnish free access to various parts of the work and assist testing inspection personnel in performance of their duties at no additional cost to the Owner.
- B. Concealed Work. When directed by the Owner, the Contractor shall open for inspection any part of the work which has been concealed. Should the Contractor refuse or neglect such a request, the Owner may employ any other person to open up the same or do so himself. If any part of the work has been concealed in violation of the Owner's instruction or, if on being opened, it is found not to be in accordance with the terms of the Contract Documents the expense of opening and recovering, whether done by the Contractor or not, shall be charged to the Contractor. If the work has been concealed but not in violation of the Owner's instructions and is found to be in accordance with the terms of the Contract Documents the actual necessary expense of opening and recovering is done by the Contractor it shall be considered as extra work and paid for accordingly.
- C. Notices. The Contractor shall notify the Owner not less than 48 hours, unless otherwise noted, before work requiring inspection is started. The Contractor shall schedule portions of the work requiring inspection and testing, so that the agency's time on the project is continuous and as brief as possible.

### **1.07 CONSTRUCTION SURVEILLANCE BY OWNER**

- A. Appointment. The Owner may appoint an on-site representative for surveillance of any and all portions of the work. Such surveillance may extend to any or all parts of the work, and to the preparation or manufacture of materials to be used.
- B. Authority of On-Site Representative. On-site representative is not authorized to revoke, alter, enlarge or relax the provisions of the Contract Documents, and is placed on the work site to keep the Owner informed as to the progress of the work and the manner in which it is being done. He may also call the attention of the Contractor to any deviations from the plans or specifications. Failure of the Owner or his representative to call the attention of the Contractor to faulty work or deviation from the Contract Documents shall not constitute acceptance of said work. The representative is not authorized to approve or accept any portions of the work or to issue instructions contrary to the Contract Documents. The representative will exercise only such additional authority as may be specially delegated to him by the Owner, notice of which will be given in writing to the Contractor.

### **1.08 DEFECTIVE WORK**

- A. Remove and replace any work found defective or not complying with requirements of Contract Documents, at no additional cost to Owner. Work will be checked as it progresses, but failure to detect any defective work or materials shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate the Owner for final acceptance.

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





## **SECTION 01500 - TEMPORARY FACILITIES**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF SECTION**

- A. Temporary utilities and miscellaneous temporary facilities required during construction. Bypass pumping systems are described in Section 01010.
- B. Providing Temporary Facilities:
  - 1. Provide temporary construction, devices, equipment, power and convenience utilities for use, convenience and safety of personnel engaged in the work of the contract.
  - 2. Provide temporary utilities and access during construction to existing home owners at all times.

#### **1.02 RELATED SECTIONS**

- A. Related Requirements Specified Elsewhere:
  - 1. Section 01010 – Summary of Work
  - 2. Section 01700 - Contract Closeout:
  - 3. Section 02370 - Erosion Control

#### **1.03 REGULATIONS**

- A. Health and safety: Conform with "Safety Standards for Construction Work, Chapter 296-155 WAC" by State of Washington Department of Labor and Industries.
- B. Construction codes: Comply with regulatory construction codes as applicable.
- C. Washington State Department of Health: Comply with all applicable codes for temporary sewer and water service.

#### **1.04 TEMPORARY FACILITIES**

- A. Temporary Electrical Light & Power:
  - 1. Provide all temporary lighting and power, including pole or poles, transformer if required, for construction purposes.
  - 2. Provide temporary connections to closest utility source.
  - 3. Provide all required extension cords, lighting outlets and power outlets (grounding type), lamps, and other required equipment and accessories necessary only for adequate temporary lighting and power for construction purposes.
  - 4. Remove temporary lighting and power equipment and their connections at completion of the work or sooner if approved or directed.
- B. Water for Construction Purposes (if needed):
  - 1. The Contractor is responsible for obtaining and providing water as required for the work.
  - 2. If agreed, Contractor to make temporary connections with metered connection with backflow preventers to utility piping as required for the work and provide meter, piping, hoses, nozzles and other accessories required.

## SECTION 01500 - TEMPORARY FACILITIES

3. At completion, or before as directed, disconnect temporary connections and piping and remove from site.
  4. Provide secure system to prevent unauthorized use during Contractor's absence.
- C. Sanitary Facilities
1. Contractor shall provide sanitary facilities in accordance with WISHA and Health Department requirements.
- D. Drinking water:
1. Provide from proven safe source, for all those connected with the work in accordance with WISHA and Health Department requirements.
  2. Pipe and transport in such manner as to keep it clean and fresh; serve in single containers or provide sanitary drinking fountains.
- E. Residential and Commercial Access
1. Provide access to residential homes and commercial enterprises at all times.
  2. Provide access to the area at all times for emergency and service vehicles.
- F. City Accesss
1. Provide access to City Operations Staff at all times, in particular if repairs are needed.

### 1.05 MISCELLANEOUS PROVISIONS

- A. Cleaning Up:
1. General: The Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. Clean up work areas as required at the end of each day's work.
  2. Trash removal: Remove all trash and debris from site and dispose of at Contractor's expense. Allow no debris, broken or open cartons, or other refuse to collect in the project or around it; allow no inflammable or hazardous materials to be stored on the site without approved protection precautions and procedures.
  3. Street and parking area cleaning: Immediately clean all spilled material which results from the work of this contract and waste hauling operations; use motorized equipment and hand labor as required. Remove from streets, driveways or parking areas in time to prevent such materials from affecting traffic or clogging street drainage system; clean any drains contaminated.
- B. Noise Control: During the period of construction, provide satisfactory means, as approved by the Owner, of controlling noise originating from construction work and equipment.
- C. Dust Control: During the period of construction, provide satisfactory means of controlling dust and dirt, including application of water to control dust but not cause erosion.
- D. Temporary Erosion and Sedimentation Control: The Contractor shall provide sedimentation and erosion control.

## **SECTION 01500 - TEMPORARY FACILITIES**

### **1.06 DEBRIS CONTROL**

- A. Cleaning during construction: Maintain all areas free of extraneous debris.
- B. Prevent accumulation of debris at construction site, storage and parking areas, and along access roads and haul routes.
- C. Keep storm sewers free of debris or extraneous materials.
- D. Offsite Cleanup: Prevent any leaking of materials from the vehicle used to haul offsite and clean haul routes *daily*.

### **1.07 POLLUTION CONTROL**

- A. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere. Allow no discharge of noxious substances from construction operations.
- B. Provide equipment and personnel; perform emergency measures required to contain any spillages. Remove contaminated soils and liquids.
- C. Take special measures to prevent harmful substances from entering public waters.
- D. Provide systems for control of atmospheric pollutants in accordance with Federal/State/Local published rules and regulations.

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



## **SECTION 01600 - MATERIAL AND EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF SECTION**

- A. General requirements for providing transportation, handling, storage, and protection of materials and equipment.
- B. Contractor's options in selection of products and manufacturers, and procedures for consideration of proposed substitutions.
- C. All material and equipment incorporated into the work:
  - 1. Shall be new, free from defects and of equal or superior quality as specified herein and on the drawings.
  - 2. Shall be the products of established manufacturers regularly engaged in the fabrication of such equipment.
  - 3. Shall comply with the size, type and quality specified and shall be designed for use in the particular application.
  - 4. Shall be designed, fabricated and assembled in accordance with standard engineering and shop practice.
  - 5. Shall be complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for intended use and effect.

#### **1.02 RELATED SECTIONS**

- A. Related Requirements Specified Elsewhere:
  - 3. Section 01300 - Submittals:
  - 4. Section 01400 - Quality Control:

#### **1.03 MANUFACTURER'S INSTRUCTIONS**

- A. Installation of all materials and equipment shall comply with manufacturer's printed instructions. The Contractor shall have the responsibility to distribute copies of such instructions to all parties involved in the installation, including the Owner. One complete set of instructions shall be maintained on the job site during installation and until completion.
- B. All materials and equipment shall be handled, installed, connected, cleaned, conditioned and adjusted in strict accordance with such instructions and in conformance with the specified requirements. The Owner should be immediately notified should job conditions or specified requirements conflict with the manufacturer's instructions.

#### **1.04 TRANSPORTATION AND HANDLING**

- A. All materials and equipment shall be transported and handled in such a manner as to prevent any damage.
- B. Deliveries of products shall be in accordance with construction schedules as to cause no delay in the work or to conflict with work and conditions at the site.

## SECTION 01600 - MATERIAL AND EQUIPMENT

- C. Products shall be delivered in the manufacturer's original containers with identifying labels intact and legible. Where materials are specified to conform to ASTM, Federal or other reference specifications, the materials shall be delivered to the site bearing the manufacturer's label stating that the materials meet the requirement of such referenced specifications.
- D. Products shall be inspected immediately upon delivery to assure compliance with specified requirements and approved submittals and that products are properly protected and undamaged.
- E. The Contractor shall provide personnel and equipment to receive and unload products delivered to the site. No products shall be delivered to the site unless such forces are available.

### 1.05 STORAGE AND PROTECTION

- A. All products shall be stored in strict accordance with the manufacturer's instructions, with seals and labels intact and legible.
- B. All products shall be arranged in a neat order and protected from damage from the weather, traffic and construction operations. Easy access for periodic inspection shall be provided.

### 1.06 PRODUCTS AND SUBSTITUTIONS

- A. Products:
  - 1. Where available, provide standard products of types which have been produced and used previously and successfully on other projects and in similar application.
  - 2. Where additional amounts of a product, by nature of its application, are likely to be needed by Owner at a later date for maintenance and repair or replacement work, provide a standard, domestically produced product which is likely to be available to Owner at such later date.
  - 3. For Products specified only by a reference standard, the Contractor may select any product meeting that standard.
  - 4. Where the make or name of a material or equipment is specified in the written documents or on the drawings, it is to establish a quality standard in that particular field of manufacture. Requests for substitutions may be submitted only if the specification states "or equal", otherwise the named material or equipment must be supplied. Requests for substitutions of materials of other makes or names must be submitted to the Owner and must receive favorable written response from the Owner prior to ordering, furnishing or installing the proposed substitution item.
- B. Requests for Substitutions:
  - 1. For a period of thirty (30) days after the Contract Date, the Owner will consider written requests from the Contractor for substitution of Products.
  - 2. Requests for each Product substitution shall be submitted separately. Requests for substitutions will be received and considered when revisions to contract documents

## **SECTION 01600 - MATERIAL AND EQUIPMENT**

are not required, and the product or material is in keeping with the general intent of the Contract Documents.

3. A request for substitution by the Contractor constitutes a representation that the Contractor:
  - a. Will provide the same warranties or bonds for the substituted item as for the Product specified.
  - b. Will coordinate the installation of an accepted substitution into the work and make all other changes as required to make the work complete in all respects with no increase to the contract price.
4. Submit six (6) copies of requests for substitutions, fully identified for Product or method being replaced by substitution, including related specification section and drawing number(s), and fully documented to show compliance with requirements for substitutions.
5. Include product data/drawings, description of methods, samples where applicable, Contractor's detailed comparison of significant qualities between specified item and proposed substitution, statement of effect on construction time and coordination with other affected work, cost information or proposal, and Contractor's statement to the effect that proposed substitution will result in overall work equal-to-or-better-than work originally indicated.
6. The contractor agrees to pay all Engineering costs accruing as a result of checking and/or redesign due to substitutions. These costs will be charged to the Contractor and will be considered incidental to the contract price.

### **C. Owner's Review**

1. Within two weeks of receipt of request, or within one week of receipt of requested additional information or documentation (whichever is later), the Owner will notify the Contractor of either his acceptance or his rejection of the proposed substitution. Rejection will include statement of the reasons for rejection (non-compliance with the requirements for requested substitutions, or other reasons as detailed.)

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





## SECTION 01700 - CONTRACT CLOSEOUT

### PART 1 - GENERAL

#### 1.01 GENERAL

- A. Related Requirements Specified Elsewhere:
  - 1. Section 01300 – Submittals
- B. Description of Section:
  - 1. Specific administrative procedures, and closeout submittals at substantial completion and at final acceptance of the work.
  - 2. Requirements for record documents and start-up procedures.
  - 3. The listing of procedures and submittals is given generally as a checklist for the Contractor's convenience. The Owner reserves the right to add to this list. This list is not an exhaustive listing of either all applicable laws or of the provisions of any law.
  - 4. The Contractor shall comply with all contract requirements prior to contract closeout. Specific administrative procedures, and closeout submittals at substantial completion and at final acceptance of the work.

#### 1.02 SUBSTANTIAL COMPLETION

- A. Prior to submitting for substantial completion, the Contractor shall have:
  - 1. Delivered tools, spare parts, extra stocks of materials, and similar physical items to Owner.
  - 2. Made final changeover of locks and transmit keys to Owner.
  - 3. Completed start-up testing of systems, and performed instructions for Owner's operating/maintenance personnel. Discontinued (or change over) and removed from project site temporary facilities and services.
  - 4. Provide record information to the owner of the as-constructed facilities.
  - 5. Completed final cleaning up requirements, including but not limited to, touch-up of marred surfaces, grading, installation of handrails, etc.
- B. When the Contractor considers the work to be substantially complete, he shall submit to the Owner:
  - 1. Written notice that the work, or designated portion thereof, is substantially complete. (The term "substantially complete" shall be defined as in accordance with the WSDOT General Specifications and also as defined herein).
  - 2. List of items to be completed or corrected and reasons for being incomplete. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents.
  - 3. Progress payment request coincident with or first following date claimed, show either 100% completion for portion of work claimed as "substantially complete", or list incomplete items and the value of the incomplete work.
  - 4. Submit statement showing accounting of changes to the Contract Sum.
  - 5. Specific warranties, workmanship/maintenance bonds, maintenance agreements, final certification and similar documents.
  - 6. Obtain and submit releases enabling Owner's full and unrestricted use of the work and access to services and utilities, including (where required) certificate of occupancy permits, operating certificates, and similar releases.

## SECTION 01700 - CONTRACT CLOSEOUT

7. Record (as-built) drawings, project manual, operation and maintenance manuals, and similar final record information.
- C. Upon receipt of Contractor's request, the Owner will either proceed with inspection or advise Contractor of prerequisites not fulfilled. Following initial inspection, Owner will either prepare letter of substantial completion, or advise Contractor of work which must be performed prior to issuance of letter; and repeat inspection when requested and assured that work has been substantially completed. Results of completed inspection will form the initial "punch list" for final acceptance.
- D. When the Engineer, on the basis of an inspection, concurs that the work is substantially complete, he will:
  1. Prepare and deliver to the Contractor a letter of Substantial Completion accompanied by the Contractor's list of items to be completed or corrected. The letter of Substantial Completion shall state the responsibilities of the Contractor for security, maintenance, damages to the work and insurance and shall fix the time within which the Contractor shall complete the items listed therein. Warranties and guarantees required by the Contract Documents shall commence on the Date of final acceptance by the City.
  2. The letter of Substantial Completion is submitted to the Contractor for their written acceptance of their responsibilities as stated therein.

### 1.03 FINAL INSPECTION

- A. When the Contractor considers the work to be complete, he shall submit written notice to the Owner that the work has been completed and inspected in compliance with the Contract Documents including punchlist items, and equipment and systems have been tested and are operational; and requesting a contract completion inspection.
- B. When the Engineer, on the basis of an inspection, concurs that the work is acceptable under the Contract Documents, he will notify the Contractor in writing and request the Contractor to provide remaining submittals.
- C. Should the Engineer determine that the work is not acceptable under the Contract Documents:
  1. The Engineer will promptly notify the Contractor in writing giving the reasons therefor.
  2. The Contractor shall remedy the deficiencies in the work and submit a new written notice for final inspection to the Owner.

### 1.04 FINAL PAYMENT

- A. When the Contractor has satisfied all requirements of this section and all other conditions of the Contract Documents, the Contractor may submit a final Application for Payment. Should the Owner determine the Work acceptable under the Contract Documents and the Agreement fully performed, he will promptly issue a final Certificate for Payment stating that to the best of his knowledge, the Work has been completed in accordance with the terms and conditions of the Contract Documents and that the entire balance due the Contractor, and as noted in the final certificate, is due and payable.

## SECTION 01700 - CONTRACT CLOSEOUT

- B. The accumulated retainage shall not be paid until the Contractor submits to the Owner:
1. Affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work for which the Owner might in any way be responsible, have been paid or otherwise settled.
  2. Release of Lien. One will be required from each lien holder who has duly filed a notice of claim with the Owner. If any liens remain unsatisfied after the expiration of the statutory lien period, the Contractor shall refund the Owner all amounts that the Owner may be compelled to pay in discharging such lien including all costs and reasonable attorney's fees.
  3. State Department of Revenue form that all taxes have been paid.
  4. State Department of Labor and Industry affidavit of wages paid.
  5. State Department of Employment Security Contractor release.
- C. The making of final payment shall constitute a waiver of all claims by the Owner except those arising from:
1. Unsettled liens or disputes.
  2. Faulty or defective work appearing after Substantial Completion under the project guarantee and equipment warranty period.
  3. Failure of the work to comply with the requirements of the Contract Documents.
  4. Terms of any special warranties required by the Contract Documents.

The acceptance of final payment shall constitute a waiver of all claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of the final Application for Payment.

### 1.05 FIELD TESTS AND ADJUSTMENTS

- A. All mechanical and electrical equipment, as required under the separate section headings, 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 and connected. Any changes, adjustments or replacements required to make the equipment operate as specified shall be performed by the Contractor as part of the Work.
- B. At least 14 days before the time allowed in the construction schedule for commencing testing and start-up procedures, the Contractor shall submit to the Engineer details of the procedure proposed for testing and start-up of all mechanical and electrical equipment, except when such procedures have been covered in the specifications.
- C. The Contractor's testing and start-up procedures shall include detailed descriptions of all preoperational electrical, mechanical and instrumentation testing work. Each control device, item of mechanical, electrical and instrumentation equipment, and all control circuits shall be considered in the testing procedures, which shall be designed, in a stepwise, logical sequence to ensure that all equipment has been properly serviced, aligned, connected, calibrated and adjusted prior to operation. The Contractor is advised that failure to observe these precautions may place the acceptability of the subject equipment in question, and he may either be required to demonstrate that the equipment has not been damaged, or replace it as determined by the Engineer. Testing procedures shall be designed to duplicate as nearly

## SECTION 01700 - CONTRACT CLOSEOUT

as possible all conditions of operations, and shall be carefully selected to ensure that the equipment is not damaged. Once the testing procedures have been accepted by the Engineer, the Contractor shall produce checkout, alignment and adjustment, and calibration sign-off forms for each item of equipment, which shall be used in the field by the Contractor and the Engineer jointly, to ensure that each item has been properly installed and tested. All testing must be performed in the presence of the Engineer.

- D. During the testing of the mechanical, instrumentation and electrical equipment, the Contractor shall make available, as necessary, representatives of the manufacturers of all the various pieces of equipment, or other qualified persons, who shall instruct the Owner's personnel in the operation and care thereof. Instructions shall include written step-by-step operation and trouble-shooting procedures with a complete description of all necessary test equipment and all protective device settings. Upon completion of testing, the manufacturer's representative shall provide the Engineer with a letter stating that the specific piece of equipment has been properly installed and tested and will satisfy the requirements of the Contract Documents.

### 1.06 RECORD (AS-BUILT) DRAWING INFORMATION

- A. During the construction period, the Contractor shall maintain a complete set of prints for the sole purpose of maintaining a day-by-day record of installed information. This information shall include, but not limited to: the size and location of all concealed or underground piping, conduit, and ductwork; all approved deviations from the specifications and drawings; the location of any visible objects relocated due to interference's or requested relocations submitted and approved on shop drawings. Such relocations shall be dimensioned.
- B. Addenda, bulletins, field orders, and change orders shall be posted and referenced in the record set of prints.

### 1.07 RECORD PROJECT MANUALS

- A. Maintain one copy of the Contract Documents, including addenda, change orders and similar modifications issued in printed form during construction, and mark-up variations (of substance) in actual work in comparison with text of the Project Manual and modifications as issued.
- B. Give particular attention to substitutions, selection of options, and similar information on work where it is concealed or cannot otherwise be readily discerned at a later date by direct observation. Not related record drawing information and product data, where applicable.

### 1.09 MISCELLANEOUS RECORD SUBMITTALS

- A. Refer to other sections of these specifications for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the work. Immediately prior to date(s) of substantial completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to Engineer for Owner's records.

### 1.10 FINAL CLEAN-UP

## **SECTION 01700 - CONTRACT CLOSEOUT**

- A. At the completion of the work, the Contractor shall leave the premises in a neat and unobstructed condition, ready for Owner occupancy. The buildings shall be left in a dust-free condition and all equipment and materials in perfect repair and adjustment.
- B. After all trades have completed their work and just before final acceptance and occupancy by owner, thoroughly clean all surfaces of project. Clean lighting fixtures and electrical equipment, including washing and polishing lenses inside and out. Wash and polish all exposed metal surfaces. Broom clean exterior paved areas and rake clear other surfaces of the grounds. All waste building materials, pipe, etc. shall be removed from the site and disposed of.

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



## SECTION 02050 - DEMOLITION

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. Related Work Specified Elsewhere
  - 1. Summary of Work: Section 01010
- B. Description of System: The work covered by this section includes the furnishing of all labor, equipment, and materials necessary for the demolition, removal, rehabilitation and equipment salvage of all construction as specified herein and as shown on the drawings.

#### 1.02 JOB CONDITIONS

- A. The major items of demolition work are at the existing Pump Station Nos. 2 & 3, as described herein.
- B. All removed equipment, materials, and debris, unless otherwise noted or requested by the Owner, shall become the property of the Contractor. The Contractor shall deliver all items to be salvaged (as directed by the City), to the storage area in City's WWTP. **The items that the City has selected for retention include the following:** existing standby generator & control panel, existing pumps & controls, pressure transducer, float switches, and misc. valving/piping as directed by City.
- C. Protection: Ensure the safe passage of persons around the area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and people and livestock.

### PART 2 - PRODUCTS

Not Applicable.

### PART 3 - EXECUTION

#### 3.01 DEMOLITION

- A. Pollution Controls:
  - 1. Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level.
  - 2. Comply with governing regulations pertaining to environmental protection.
- B. Removal Requirements:
  - 1. Provide complete removal and disposal of all structures identified for demolition. All pipes connected to abandoned structures are to be plugged/grouted in an approved manner, preventing any potential water and/or sewer leaks. Salvage items as directed by City officials.

## SECTION 02050 - DEMOLITION

- C. Sequence of Demolition:
1. Contractor shall construct the new force main, meter vault, and bypass port improvements prior to putting the pump stations on bypass pumping. Proposed wastewater equipment is to be purchased and on-hand (pumps to be pre-purchased by the City) and the bypass pumping system shall be in place and operational, prior to taking the pump stations offline. Contractor is to coordinate removal/demolition with City operations (a minimum of 1 week) prior to all removal/demolition work.
- D. General Overview of Structures and Improvements to be Removed or Demolished:
1. Pump Station - Mechanical (Salvage Items as directed by City)
    - a. Pumps, piping, valves, supports, pump shafts & guards,
    - b. Water piping in Motor Room and Pump Room,
    - c. Gas piping in Motor Room,
    - d. Dry-side & Wet-side ventilation ducting, supports, and ventilation fans,
    - e. Wet Well ladder and Wet Well roof drain piping.
  2. Pump Station – Electrical (Salvage items as directed by City)
    - a. Generator, skid, and associated conduits and wiring.
    - b. Generator exhaust fan and exhaust piping & supports.
    - c. Electrical panels, MCCs, lights, sensors, switches, conduits and wiring as directed on the electrical plans.
    - d. Exterior building lighting as directed on the electrical plans.
  3. Pump Station – Building (Salvage items as directed by City)
    - a. Membrane roofing and flashing.
    - b. Rooftop skylights and exhaust ventilators
    - c. Rooftop antenna – Remove & replace.
    - d. All louvers, doors and frames.
    - e. All miscellaneous unused metal supports, attachment points, and other abandoned pipes/conduits from the interior & exterior walls
  4. Site – (Salvage items as directed by City)
    - a. Bollards, skate rails, bleachers, trash cans,
    - b. Gas Meter & piping, (coordinate with Cascade Gas),
    - c. Water Meter & piping, (coordinate with City),
    - d. Primary power cabinets & meter, (coordinate with PSE),
    - e. Sawcut concrete and asphalt as detailed on the plans,
    - f. Remove and/or grind down asphalt as detailed on the plans,
    - g. Remove sidewalk, curb, & gutter as detailed on the plans.
  5. See electrical drawings and specifications for additional demolition items/requirements.

### 3.02 DISPOSAL OF DEMOLISHED MATERIAL

- A. General. Remove from the site debris, rubbish, and other materials resulting from demolition operations. Burning of removed materials from demolished structures will not be permitted on the site. Comply with all federal, state and local regulations regarding hauling and disposal.



## **SECTION 02050 - DEMOLITION**

- B. Removal. Transport materials removed from demolished structures and dispose of at a legal disposal site.

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



## **SECTION 02260 - EXCAVATION SUPPORT AND PROTECTION**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF SECTION**

- A. This section includes all work related to providing temporary support and protection for excavations to safeguard public health, protect workers, protect existing improvements and insure the safe prosecution of the work. The Contractor may elect to employ any combination of shoring, tunneling, boring, sliding trench shield, or other means to complete the work.
- B. The Contractor shall provide all equipment, material, labor and design services necessary to develop and maintain adequate excavation support and protection. The Contractor shall determine the need for and adequacy of excavation support and protection requirements.
- C. The Contractor shall be solely responsible for any excavation support and protection or trench safety systems employed on the project. In no way shall the Owner assume any responsibility for the protection of life or property implied by the use of such systems.

#### **1.02 RELATED SECTIONS:**

- A. Related work specified elsewhere:
  - 1. Section 02315 - Trench Excavation and Backfill

#### **1.03 REFERENCE STANDARDS**

- A. 29 CFR 1926 Subpart P - Excavations

#### **1.04 LAWS AND REGULATIONS**

- A. The Contractor shall comply with and give notices required by all federal, state, and local laws, ordinances, rules, regulations and lawful orders of public authorities applicable to performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither the Owner nor Engineer or their staff will be responsible for monitoring Contractor's compliance with Laws and Regulations.
- B. All structure excavation, trenching, and shoring shall be performed in strict compliance with 29 CFR 1926 Subpart P - Excavations as well as all other applicable local, State, Contracting Agency, and Federal laws and regulations."
- C. The Contractor is to provide a stamped shoring plan prior to beginning excavation work in areas where required. OSHA standards are to be followed at all times, and minimizing risk is a priority.

## **SECTION 02260 - EXCAVATION SUPPORT AND PROTECTION**

### **1.05 MEASUREMENT AND PAYMENT**

- A. The costs for Excavation Support and Protection shall be included in the lump sum price for Trench Safety Systems. No extra payment will be made unless the quantity of trenching changes as direct result of a change in the scope of work by an approved change order.

### **PART 2 - PRODUCT**

Not Applicable.

### **PART 3 - EXECUTION**

#### **3.01 METHODS**

- A. The Contractor shall make the determination as to the most effective means for ensuring excavation support and protection. This may include, but is not limited to, the following:
  - 1. The Contractor may dig open pits or perform extra excavation (at no expense to the Owner) without shoring or cofferdams.
  - 2. Use of shoring or cofferdams if in compliance.
  - 3. Specific requirements related to working in trenches shall conform with the most recent edition of the *WSDOT Standard Specifications*.
- B. Any damage to existing or proposed improvements resulting from the Contractor's excavation support and protection system shall be repaired and included as a part of this pay item.

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

## **SECTION 02315 - TRENCH EXCAVATION AND BACKFILL**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. Work within this section includes trenching, bedding, backfilling, compacting and disposal of excess materials as required for installation of all underground utilities, conduit and other miscellaneous structures.
- B. The Contractor shall supply all material, equipment and labor necessary to complete the excavation and backfill operations necessary to install the underground utilities depicted on the plans.

#### **1.02 RELATED SECTIONS**

- A. Related work specified elsewhere:
  - 1. Section 02260 - Excavation Support and Protection
  - 2. Section 15100 - Piping

#### **1.03 REFERENCE SPECIFICATIONS**

- A. The most recent version of the *WSDOT Standard Specifications*.

#### **1.04 QUALITY ASSURANCE**

- A. The Contractor shall comply with the requirements of all applicable regulatory agencies having jurisdiction over this work including 29 CFR PART 1926 -- SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION.
- B. There shall be a minimum of one in place density measurement per every 50 LF of trench and one measurement under each precast concrete structure. The Engineer may increase or decrease the frequency if the properties of the soils being placed change or the equipment or procedures used by the Contractor for compacting the soil change. In place density shall be measured using ASTM D-1556 or ASTM D2922 and D3017 (nuclear density) test methods. The Owner will subcontract testing work through a certified testing lab, and Contractor is required to coordinate with testing lab as work progresses.
- C. Material sample and proctor test results shall be provided in advance for any proposed fill material not certified to be compliant with WSDOT Standard Specs.

#### **1.05 JOB CONDITIONS**

- A. The Contractor shall provide protection of existing utilities affected by the work and make every effort to minimize disruptions to all utility services.
- B. If, during the course of construction, it is anticipated that excavation will interrupt traffic or parking areas for longer than 10 to 15 minutes the Contractor must provide advance notice to the Owner. For longer intervals or complete shut-downs, the Owner requires 48 hour advance notice. This advance notice allows time to deliver community notices in advance of the route delays or re-routes. In the event of such road closures, the Contractor shall be

## SECTION 02315 - TRENCH EXCAVATION AND BACKFILL

solely responsible for all traffic control measures including but not limited to flagging, barricades and cones.

- C. The Contractor shall provide a traffic control plan per WSDOT requirements. Traffic control plan to be submitted for review and acceptance prior to commencing work. See Section 01300 Submittals.
- D. Trenches shall be closed or covered with steel plates at the end of each work day.

### 1.06 SUBMITTALS

- A. The Contractor shall furnish the following submittals as part of completing the work associated with this section:
  - 1. Location of disposal sites for excess excavated material.
  - 2. Gradation test results for imported foundation, bedding and backfill material.
  - 3. Proctor tests for proposed imported materials which are not identified as approved for use by WSDOT.
  - 4. Geotextile fabrics cut sheets or WSDOT QPL.

## PART 2 - PRODUCTS

### 2.01 FOUNDATION BACKFILL (To replace unsuitable material)

- A. Where the base of the trench or excavation lacks the stability to support the structure, unsuitable material shall be replaced with aggregate complying with the most recent version of the WSDOT Standard Specifications, Section 9-03.12(1) — *Gravel Backfill for Foundations, Class A*.

### 2.02 PIPE ZONE GRAVEL BEDDING

- A. Pipe zone bedding material for all pipe shall comply with the most recent version of the WSDOT Standard Specifications, Section 9-03.12(3) — *Gravel Backfill for Pipe Zone Bedding*.

### 2.03 BANK RUN GRAVEL BACKFILL

- A. All bank run gravel backfill for trenches WSDOT Standard Specifications, Section 9-03.19.

### 2.04 CRUSHED SURFACING TOP COURSE (CSTC)

- A. All CSTC under pavement, retaining walls, and concrete structures shall be per WSDOT Standard Specifications, Section 9-03.9(3).

### 2.05 QUARRY SPALLS

- A. All quarry spalls for use on pipe inlet/outlet protection and berm rock shall be per WSDOT Standard Specifications, Section 9-13.1(5) and have a maximum size of 6-inches.

## **SECTION 02315 - TRENCH EXCAVATION AND BACKFILL**

### **2.06 SEPARATION GEOTEXTILE**

- A. All separation geotextile shall be non-woven per WSDOT Standard Specifications, Section 9-33.2(1), Table 3.

## **PART 3 - EXECUTION**

### **3.01 UTILITY LOCATION**

- A. The Contractor shall make every effort to identify the location of all existing underground utilities. Contractor shall provide 48-hours in advance of any excavation within road rights-of-way, the Contractor shall contact the appropriate utility locate service(s) as follows:
  - The utility locates for water, sewer, and "customer owned" utilities are to be performed by a private locate service (such as Applied Professional Services at 425-888-2590 or Central Locating Services at 425-489-4254).
  - The PSE electrical main lines, CNG gas lines, and Phone line utility locates are through Call Before You Dig at 1-800-424-5555.

### **3.02 TRENCH EXCAVATION**

- A. Trench excavation shall conform with the most recent version of the WSDOT Standard Specifications. Special attention shall be paid to the requirements for trench safety noting that all work shall be performed in strict compliance with 29 CFR 1926.
- B. The Contractor shall be solely responsible for any shoring, cofferdams or trench safety systems employed on the project. In no way shall the Owner or Engineer assume any responsibility for trench safety or the protection of life or property implied by the use of trench safety systems.
- C. The width of excavation for utility trenches shall be in accordance with WSDOT Standard Specification. No additional payment will be made for extra excavation required due to poor soil conditions.
- D. All excess material generated during trench excavation shall be disposed of offsite by the Contractor in accordance with all applicable local, State, and Federal regulations. Offsite disposal shall be incidental to the contract and at no additional cost to the Owner.
- E. The Contractor shall provide and operate all material, equipment and labor necessary to keep excavations and earth embankments free from water during construction. Dewatering shall prevent weakening foundations, undercutting trench walls, or otherwise affecting the stability of sub-grades and foundations. The Contractor shall establish and maintain positive drainage away from excavations to prevent surface water from entering excavations. Water shall be disposed of in a manner which prevents injury to public or damage to property.
- F. The Contractor shall backfill or otherwise cover all trenches at the end of each working day to protect public safety. The length of open trench excavation in advance of pipe laying operations shall not exceed 200 feet unless approved by the Owner. In no case shall the

## SECTION 02315 - TRENCH EXCAVATION AND BACKFILL

length of an open trench or size of an excavation exceed the Contractor's ability to safeguard the public welfare.

### 3.03 BEDDING

- A. Pipe bedding and pipe zone backfill installation shall comply with the WSDOT Standard Specifications, Section 7-08 — *General Pipe Installation Requirements* and per the Plans.
- B. Pipe bedding and pipe zone backfill shall be compacted to 90% of the maximum dry density described in ASTM D1557. Pipe bedding and pipe zone backfill shall be compacted in 6-inch maximum lifts.

### 3.04 BACKFILL

- A. Trench and structure backfilling shall comply with the most recent version of WSDOT Standard Specifications, Section 7-08 — *General Pipe Installation Requirements* and per the Plans.
- B. Structure backfilling shall comply with the most recent version of WSDOT Standard Specifications, Section 2-09.3(1)E *Backfilling* and per the Plans.
- C. In areas beneath driveways, parking, sidewalks, or within 5-feet of the roadway template (including shoulder or structures), backfill shall be compacted to 95% of the maximum dry density described in ASTM D1557. Backfill within the roadway template shall be compacted in 6-inch maximum lifts.
- D. In landscaped or native areas outside roadway templates and not beneath pavement, gravel paving, drives or sidewalks, backfill shall be compacted to 90% of the maximum density described above.
- E. Construction shall progress only when weather conditions will not adversely affect the quality of the finished work. At the same time, the Contractor must be prepared to take such measures as are necessary to complete the construction within the specified contract period. Where soils cannot be compacted due to moisture content, material shall be aerated or removed and replaced with a suitable granular backfill material. Contractor shall bear all costs for necessary extra measures and/or rework if excavated material is made unsuitable by adverse weather conditions and not protected by contractor in accordance with WSDOT Standard Specifications covering contractor requirements for protection of excavated materials.

### 3.05 UNSUITABLE TRENCH OVEREXCAVATION

- A. In the event that during trenching unsuitable material is encountered at the trench bottom, the Owner shall be notified of such areas prior to placing pipe. The specific areas of unsuitable material shall be addressed as described herein. Work under this item shall be allowed ONLY upon written authorization of the Owner.
- B. Unsuitable material shall be overexcavated 18-inches below the trench neat line and filled with crushed surfacing conforming to WSDOT 9-03.9(3) and compacted to 95 percent of



## **SECTION 02315 - TRENCH EXCAVATION AND BACKFILL**

maximum dry density described in ASTM D1557. Fill up to the trench neat line to allow room for the bedding material.

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



## **SECTION 02370 - EROSION AND SEDIMENTATION CONTROL**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. Work in this section consists of temporary measures for the prevention of accelerated soil erosion and sedimentation of streams or other bodies of water.
1. The erosion and sediment control measures shown in the plans and specifications are the minimum requirements for the anticipated site conditions. The Contractor shall maintain and upgrade these measures as necessary to prevent sediment-laden water or turbid water from either flowing off the site, or into new/existing storm drainage facilities such as catch basins, culverts, or storm sewers. In addition, the Contractor shall note all BMPs or Erosion/Sediment control measures implemented on the TESC Plan Sheets in red, for the life of the Contract. Updated plan sheets will be available for review at all times at the project site.
  2. Implementation of the TESC Plan shall include, but is not limited to, installing, maintaining, inspecting and repairing all temporary erosion and sediment control and spill control Best Management Practices (BMPs) included in the plans and as defined in the current edition of the Washington State Department of Ecology Stormwater Management Manual for Western Washington and as defined by the EPA. All BMPs shall be inspected, maintained, and repaired by the Contractor as needed to assure continued performance of their intended function. All on-site erosion and sediment control measures shall be inspected at least once every seven days and within 24 hours after any storm event of greater than 0.5 inches within a 24-hour period. Damaged or inadequate erosion control measures shall be corrected within 24 hours of the inspection. The Contractor shall ensure that erosion and sediment control measures are in place and functional at the end of each work day.
  3. If erosion and sediment control measures are observed to be not functional, the Owner/Engineer will notify the Contractor of the deficiency. The Contractor shall have four hours to correct the deficiency if it is raining and runoff is present. Otherwise, the Contractor shall have eight hours or until the end of the day to correct the deficiency. The rigorous enforcement of erosion and sediment control measures is necessary to prevent turbid runoff from the project site.
  4. The Contractor shall respond immediately to any urgent request by any governmental agency. If there is no response within two (2) hours, the Owner may elect to either take action themselves or hire another Contractor to perform needed repairs/installations. All costs incurred to accomplish this, including labor, overhead, materials, management, etc., will be deducted from the next pay request.
  5. Permanent Stabilization - Existing vegetation shall be preserved where possible within the project limits. The primary objectives shall be the prompt restoration and reseedling of disturbed areas, and to provide immediate slope stability and erosion control. The latter may be accomplished using a combination of hand seeding and mulching. All temporary erosion and sedimentation control BMPs shall be removed within 30 days after final site stabilization or after the facilities are no longer needed.

## **SECTION 02370 - EROSION AND SEDIMENTATION CONTROL**

### **1.02 RELATED SECTIONS**

- A. Related work specified elsewhere:
  - 1. Section 02260 - Excavation Support and Protection
  - 2. Section 02315 - Trench Excavation and Backfill

### **1.03 SUBMITTALS**

- A. The Contractor shall submit product specifications and installation recommendations for all materials to be provided under this section.

## **PART 2 - PRODUCTS**

- 2.01 Any product, that is required for adequate erosion control, including, but not limited to: construction access ramps, check dams, silt fence, compost berms, catch basin inlet protection, hydroseeding, plastic ground cover, jute matting, etc. Products shall be in accordance with the Standard Specifications Section 9-14.

- A. Temporary Silt Fence
  - 1. Temporary silt fence shall meet the requirements of Standard Specifications Section 9-33.2.
- B. Stabilized Construction Entrance – Track Clean Plates
- C. Catch Basin – Inlet Protection Socks
- D. Compost Berms – Coarse compost per WSDOT Standard Specifications 9-14.4(8).

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. The Contractor shall carry out the provisions of the TESC Plan.

### **3.02 PLANNING OF CONSTRUCTION**

- A. Plan and coordinate the construction to reduce sediment pollution. Minimize the area of disturbance. Keep the area of clearing and grubbing to the minimum necessary to facilitate construction.

### **3.03 MAINTENANCE**

- A. Maintain the erosion control measures and facilities in proper condition so that they will individually and collectively perform the functions for which they were designed and per the TESC Plan. In order to insure the effectiveness and proper maintenance of the measures and facilities, the Contractor and Owner shall make periodic inspections at sufficiently frequent intervals to detect any impairment of the structural stability, adequate capacity, or other requisites of the herein approved measures and facilities

## **SECTION 02370 - EROSION AND SEDIMENTATION CONTROL**

which might impair their effectiveness. The Contractor shall take immediate steps to correct any such impairment found to exist at no additional cost to the Owner.

- B. Inspection, or lack thereof, shall not relieve the contractor of the responsibility of maintaining erosion control at all times. The contractor should, therefore, check all erosion control periodically on their own to ensure adequacy.

### **3.03 PUMP WATER**

- A. Practice sound pump water management to reduce sediment production. Discharge pump water onto stabilized surfaces and allow to soak into vegetated ground and filter through existing vegetation. Provide BMPs, as needed, to remove all sediment from pumped groundwater which may flow off-site. Repair discharge areas, upon completion of construction, to pre-existing conditions or better.

### **3.04 STABILIZATION**

- A. Stabilize all slopes, channels, ditches or any disturbed area as soon as possible after the final grade or final earthmoving has been completed. Upon completion of the project, stabilize all areas which were disturbed by the project to prevent accelerated erosion. Maintain any erosion and sedimentation control facility required or necessary to protect areas from erosion during the stabilization period, regardless of the length of time required - even if it extends beyond the date of substantial completion.

### **3.05 EARTHWORK**

- A. Control excavation for site work operations. Stockpile the material removed from the excavation in areas where a minimum of sediment will be generated and where other damage will not result from the piled earth. Stockpile topsoil separately and redistribute uniformly after grading.
- B. Protect all stockpiled soil materials from erosion through the use of plastic sheeting or similar temporary measures.

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



## **SECTION 02830 – BARRIER RAIL AND GATES**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. Work consists of furnishing all labor, materials, and incidentals necessary to install two precast concrete barrier rails and one double-swing steel barrier gate at Pump Station #2.
- B. Work included
  - 1. Precast concrete barrier rails with steel pipe rail,
  - 2. 24-ft, double-swing barrier gate with hinge posts and gate stop posts.

#### **1.02 RELATED SECTIONS**

- A. Section 05500 - Metal Fabrications

#### **1.03 REFERENCE STANDARDS**

- A. American Society for Testing and Materials (ASTM)
  - 1. A 53 Standard Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.

#### **1.04 SUBMITTALS**

- A. Submit shop drawings showing barrier rail and barrier gate dimensions, materials of construction, and coatings.

#### **1.05 QUALIFICATION OF INSTALLER**

- A. Installer must be experienced in gate installations and must examine conditions under which gate is to be installed. The Contractor shall notify the Engineer in writing of improper conditions of work, and shall not proceed with work until unsatisfactory conditions have been corrected.

#### **1.06 QUALITY ASSURANCE**

- A. Provide certifications from the manufacturers confirming that the product provided meets the specifications.

### **PART 2 - PRODUCTS**

#### **2.01 BARRIER RAIL**

- A. Precast Concrete Security Barrier – “Port of Seattle” Parking Barrier as manufactured by Granite Precasting & Concrete, Inc., or approved equal.
  - 1. Concrete:  $F_c=6,000$  psi,

## **SECTION 02830 – BARRIER RAIL AND GATES**

2. Reinforcement: ASTM A-615 Grade 60,
3. 1 ½" Bar Cover Typical,
4. Weight = 1,350 lbs. (~270lbs/ft),
5. Designed to withstand 1,500 lbs. horizontal impact (18-in above grade).
6. Equipped with 3-in diameter, Schedule 40 steel pipe rail manufactured and coated per Section 09 90 00.
7. Cast-in-place pipe sleeves to be provided by the Contractor to the precast manufacturer.

### **2.02 BARRIER GATE**

- A. Barrier Gate – Custom Double-Swing Forestry Gate as manufactured by Automated Gates and Equipment (Seattle, WA, (206)767-9080), or approved equal.
  1. 6"x6"x1/4" Steel Gate and Gate Stop Posts with caps.
  2. 3"x3"x1/4" Welded Steel Gates, 2 each.
  3. Heavy-duty, Stainless Steel Square Hinges with double ball bearings, Power Hinge or approved equal.
  4. Base plate covers at each post base,
  5. Anchor J-bolts for post mounting,
  6. Tamper-proof padlock latch assembly.
  7. Gates and posts to be shop coated with two coats of Sherwin Williams Hi-Solids Polyurethane, or approved equal.

### **2.03 CONCRETE FOOTINGS**

- A. Concrete shall be mixed and placed in strict accord with Section 03300 and the contract plans.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Install barrier rail and gates in strict accordance with the manufacturer's recommendations and the Contract details on the plans. Gates shall be installed level across the access drive opening.

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



## SECTION 02920 - LANDSCAPING

### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK

- A. Work in this section shall include all labor, equipment and materials necessary for re-establishing grass vegetation in areas disturbed during construction at both pump stations and providing replacement shrubs and mulch in the unpaved area south of Pump Station #3. Work shall include stripping, excavation, hauling, stockpiling, placing topsoil, placing mulch, hydro-seeding, and planting shrubs.

#### 1.02 RELATED SPECIFICATIONS

- A. Section 02370 - *Erosion and Sedimentation Control*

#### 1.03 SEEDING AND PLANTING GUARANTEE

- A. During the one (1) year guarantee period should any seeded area show signs of failure such as dead or dying areas of grass, bare spots, dead or dying plants, etc., the Contractor shall repair or replace all deficient items to the satisfaction of the Engineer.
- B. All graded areas not seeded or paved by October 15 shall be covered with two (2) inch depth straw to prevent erosion. Straw to be provided and installed by the Contractor. Do not perform planting or seeding when ground is frozen, snow covered, muddy or in an otherwise unsatisfactory condition. When unforeseen conditions detrimental to plant growth are encountered, such as adverse drainage conditions, obstructions, compaction, or toxified soils, notify the Engineer before proceeding.

#### 1.04 SUBMITTALS

- A. The Contractor shall submit product specifications and installation recommendations for all materials to be provided under this section.
- B. Submit seed vendor's blue tag certification for required grass seed mixture, indicating percentage by weight, and percentages of purity, germination, and weed seed for each grass species.
- C. Upon seeded areas acceptance, submit written maintenance instructions recommending procedures for maintenance of seeded areas.
- D. Submit nursery supplier name and photos of shrubs.
- E. Submit samples of topsoil and mulch products.

## SECTION 02920 - LANDSCAPING

### PART 2 - PRODUCTS

#### 2.01 TOPSOIL MATERIAL

- A. Topsoil shall conform to Section 9.14.1(2) of the Standard Specifications.

#### 2.02 GRASS SEED

- A. Seed shall conform to Table 1 below. Seed of the following composition, proportion, and quality shall be applied at a rate of 8 pounds per 1000 square feet:

Table 1	
Common Name	% by Weight
Nobility Perennial Ryegrass	30
Amazing GS Perennial Ryegrass	30
Longfellow II Chewings Fescue	20
Gibilbralter Creeping Red Fescue	20

This mixture is provided by Sunmark Seeds under the name DOT Multipurpose Mixture. Seeds shall be certified "Weed Free" indicating there are no noxious or nuisance weeds in the seed.

#### 2.03 FERTILIZER

- A. Fertilizer shall be a granular, non-burning product composed of not less than 50% organic, slow acting, guaranteed analysis professional fertilizer. Seeded area starter fertilizer containing 20% nitrogen, 26% phosphoric acid, and 6% potash by weight, or similar approved composition applied at a rate of 6.5 lbs/1000 SF.

#### 2.04 WOOD FIBER MULCH FOR HYDRO-SEEDING

- A. Hydro-seeding to be applied to all areas disturbed and/or regraded (which will not be protected with quarry spalls, gravel, and/or pavement) during construction. Commercially prepared wood fiber mulch specifically manufactured for hydro-seeding application shall be used.
- B. Dispersing agents may be added at Contractor's option provided that the additive is not harmful to the mixture.

## **SECTION 02920 - LANDSCAPING**

### **2.05 SHRUBS**

- A. 2-gallon size potted and container stock well rooted, vigorous enough to insure survival and healthy growth.
- B. Container plants shall have grown therein a minimum of six months and a maximum of two years, with roots filling the containers but not showing evidence of being or having been root bound.
- C. Genera and species to be determined by City Staff.

### **2.06 WOOD MULCH FOR LANDSCAPE AREAS**

- A. Description: Ground fir or hemlock bark, free from noxious weed seeds, sawdust, splinters or other debris. Bark mulch shall not contain foreign material (including plastic or other debris), chemicals, and substances detrimental to plant life, including resin, tannin, wood fiber, or other compounds.
- B. Fir and/or Hemlock bark, 1-in minus size with less than 30% bark finer than 1/4-inch size.

### **2.07 WATER**

- A. The Contractor shall furnish water as required for planting and establishing vegetation in seeded areas. Provide all necessary hoses, equipment, attachments, and accessories for adequate watering of seeded areas.

## **PART 3 - EXECUTION**

### **3.01 SEEDING**

- A. Inspect all subgrades for debris and adverse drainage conditions. Remove all debris including rocks 1-inch in diameter and larger, sticks, roots, sod and other deleterious material. Notify the Owner of any grades or conditions which might create adverse or undesirable drainage patterns.
- B. Smoothly blend and feather topsoil into existing surrounding grades. Rake or lightly harrow topsoil until the soil is friable and of uniform texture and satisfactory for seed placement.
- C. After seeding, topsoil shall be rolled for compaction and shall be minus 1/2-inch below all adjacent paved or graveled surfaces. Irrigate immediately until soil is damp to about 6".
- D. The hydro-seeding operation shall include the installation of seed, fertilizer, mulch, and tackifier with a tracer to verify uniform application.
- E. Hydro-seeding shall be done in accordance with WSDOT Spec. 8-01.3(2)B.
- F. Seed immediately after preparation of seed bed. Seeding may occur August 15 to October 15.

## **SECTION 02920 - LANDSCAPING**

- G. Seed shall be applied at a rate listed above.
- H. Mulch shall be applied at a rate of 2,000 pounds per acre.

### **3.02 MAINTENANCE AND WATERING**

- A. Patch, repair and re-seed any and all damaged or barren areas observed prior to final project acceptance at no additional cost to the Owner.
- B. The Contractor shall protect and care for all seeded areas until fully established and hearty. Care shall include equipment and labor necessary to provide sufficient and continuous watering of all seeded areas until final acceptance.

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

## **SECTION 03300 – CAST-IN-PLACE & PRECAST CONCRETE**

### **PART 1. GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Work includes but is not limited to the following:
  - 1. All material, labor, and equipment to prepare subgrade, build forms, install rebar, and place concrete for the incidental cast-in-place concrete shown on the Plans. Compensation for all costs associated with cast-in-place concrete shall be incidental to the lump sum bid items in which the work is identified.
  - 2. All material, labor, and equipment required to furnish and install all precast concrete vaults, top slabs, and the effluent wet well.

#### **1.02 RELATED SECTIONS**

- A. Coordinate related work specified in other parts of the Project Manual, including but not limited to following:
  - 1. Section 02315 Trench Excavation & Backfill

#### **1.03 REFERENCES**

- A. Drawing Structural Notes, which provide additional structural specifications. The Drawing Structural Notes control in the event of conflict with these specifications.
- B. Comply with the requirements of Section 01 41 00 REGULATORY REQUIREMENTS, and as listed herein.
- C. Comply with the following references (C – G). Where conflicts may arise, comply with the more stringent requirements.
- D. WSDOT Standard Specifications for Road, Bridge and Municipal Construction, 2016 Edition.
- E. Washington State Department of Ecology August 2012 Stormwater Management Manual for Western Washington.
- F. American Concrete Institute (ACI) ACI-318-11, Building Code Requirements for Structural Concrete.
- G. ACI 117-10 Specification for Tolerances for Concrete Construction.
- H. Concrete Reinforcing Steel Institute (CRSI), Manual of Standard Practice, 28<sup>th</sup> Edition.

#### **1.04 SUBMITTALS**

- A. Product Data: Required for each material and product to be incorporated into the Work.
- B. Samples: Submit samples of materials as specified and as otherwise requested by Engineer, including names, sources and descriptions.
- C. Shop Drawings: Required for all precast concrete structures.
- D. Laboratory Test Reports: Required for concrete materials and mix design.
- E. Material Certificates: Signed by manufacturer and Contractor; Submit in lieu of laboratory test reports as acceptable to Engineer, demonstrate compliance with requirements.
  - 1. Certification of admixtures compatibility by Contractor's approved technician.

## **SECTION 03300 – CAST-IN-PLACE & PRECAST CONCRETE**

- F. Mix Design: Written proposal for each concrete mix and strength required submit 15 days prior to start of Work. The mix design shall list the following
  - 1. All materials and admixtures and their proportions.
  - 2. Water-cement ratio, slump, and aggregate grading.
  - 3. Evidence that mix design meets the strength requirements: Compression test data (field experience method) or results of testing (trial batch method) used to establish mix proportions.
  - 4. Indicate materials sources for principal constituents.
  - 5. Whether the mix is appropriate for pumping.
  - 6. Evidence of ability of mix to meet requirements for limited shrinkage.
- G. Submit schedule of concrete placement operations before commencing Work, show on one or more plans or elevations, locations of construction, contraction and expansion joints.

### **1.05 QUALITY ASSURANCE**

- A. Regulatory Requirements: See referenced Codes, ordinances and the like as well as Section 01400 QUALITY CONTROL.
- B. Testing and Inspection. Owner will provide independent testing and inspection outside of the contract. Contractor shall coordinate and cooperate with Owner's independent testing and inspection agency which will perform the following tasks:
  - 1. Compaction and Moisture Control Tests on foundation subgrade prior to placement reinforcing.
  - 2. Reinforcing placement, lap length, and bar sizes. Concrete placement.

### **1.06 PROJECT SITE CONDITIONS**

- A. Coordination: Notify the Engineer upon completion of subgrade preparation work, completion of base course, and also of intended schedule for placement.
- B. Establish and maintain required lines and elevations.
- C. Follow ACI 318 requirements for hot and cold weather work. Protect concrete with curing blankets for a minimum of 72 hours when temperatures are expected to be below 38 degrees F for more than 3 hours. When temperatures are expected to be above 85 degrees F for more than 12 hours, use curing compound or continuous wetting techniques to reduce cracking. The Owner shall have authority to require such protections based on National Weather Service hourly forecasts.

## **PART 2. PRODUCTS**

### **2.01 GENERAL**

- A. Comply with "Quality Assurance" provisions, "References," and Specifications. Where these may be in conflict, the more stringent requirements govern.

### **2.02 CAST-IN-PLACE CONCRETE MATERIALS**

- A. Concrete: Mix design shall be as outlined in the Structural Notes included on Structural Plans.

## SECTION 03300 – CAST-IN-PLACE & PRECAST CONCRETE

- B. Reinforcing steel shall be as outlined in the Structural Notes included on Structural Plans.
- C. Joint Sealant. Joint Sealant shall be GREY IN COLOR approximating matching color of concrete and meet WSDOT Standard Specification 9-04.2.
- D. Premolded Joint Filler for Expansion Joints. Pro-Flex manufactured by Oscoda, or approved; 100 percent recycled vinyl.

### 2.03 PRECAST CONCRETE STRUCTURES

- A. Flowmeter Manhole, Base, & Topslab – Structural Precast Concrete
  - 1. Pre-cast manhole, base, and top slab components shall have 28-day compressive strength of 6,000 psi. Rebar shall be ASTM A615 Grade 60. Mesh reinforcing, if any, shall be ASTM A-185 Grade 65. Design shall be per ACI 318-83 Building Code, and ASTM C-857 "Minimum Structural Design Loading for Underground Precast Concrete Utility Structures".
    - a. Meter Vault (PS #2 & PS #3) – 72-in diameter Type 3 Manhole per WSDOT Standard Plan B-30.90-01 and as detailed on the contract plans.
    - b. Meter Vault Hatch (PS #2 & PS #3) – Double-Leaf 30"x48" H020 rated Aluminum Hatch with Safety Grate System, Syracuse Castings DTD-10HDA05G or approved equal. Contractor responsible for redesign of non-standard opening in top slab.
- B. Bypass Pumping Port Assembly Vault
  - 1. Meter Vault – Precast concrete meter vault with cast iron lockable lid, & H-20 loading. Precast components shall have 28-day compressive strength of 5,000 psi. Rebar shall be ASTM A615 Grade 60. Granite Precast 30x30 MV or approved equal.
- C. Precast Concrete Trench
  - 1. Precast Concrete Trench: Precast concrete trench shall be 25 x 15 Precast Trench by Granite Precasting & Concrete or approved equal. Concrete shall have a minimum 4,000 psi compressive strength in seven days, and rebar shall conform to ASTM A-615 Grade 60. Precast trench design shall conform to ASTM C-857 "Minimum Structural Design Loading for Underground Precast Utility Structures". Precast trench shall be rated for AASHTO HS-20 loading.
- D. Cement Grouts:
  - 1. Anchor Bolt and Plate Grout for Non-Mechanical Equipment: Cement grout to fill anchor bolt pockets, handrail pockets, and under non-mechanical equipment base plates shall be non-shrinking, non-staining, non-metallic grout with a minimum 6,000 psi compressive strength in seven days. Allow for ¾" trout where not shown otherwise. Clean all contact surfaces and place grout completely under plate, without voids.
  - 2. Portland Cement Grout: Portland Cement Grout shall be used to provide slopes between wall and slabs shall be one part Portland Cement to two parts sand with an expansive agent to limit shrinkage. Sufficient water shall be added for placement while maintaining a minimum 4,000 psi 28 day compressive strength.
- E. Epoxy Grout:

## SECTION 03300 – CAST-IN-PLACE & PRECAST CONCRETE

1. Epoxy grout to be used for mechanical equipment base pads such as pump bases. Epoxy shall be a moisture-tolerant three-component mix: two-part epoxy resin and aggregate. Epoxy grout shall be specifically labeled for long-term support and precision alignment of machinery and conform to ASTM C 881, TYPE IV, Grade 1, such as Master Builders Technologies MASTERFLOW 648 CP PLUS or Sika Corporation SIKADUR 42 GROUT PAK.
- F. Waterstops:
1. Hydrophilic bentonite or modified chloroprene rubber; Cetco Waterstop – RX101T Greenstreak Hydrotite CJ0725, or equal. Maintain 3” minimum cover from face of waterstop to face of concrete. Remove all dirt, coatings, and debris from concrete surface. Install waterstop per manufacturer’s instructions.
- G. Sealant Gaskets:
1. The sealant gaskets shall be pre-formed, continuous rope form plastic material, protected by a removable two-piece wrapper.
  2. Sealing compound shall be reinforced hydrocarbon resins blended with plasticizing compounds and reinforced with inert mineral filler. The sealing compound shall have no solvents, irritating fumes or obnoxious odors. T
  3. The adhesive and cohesive strength of the sealant gaskets shall not be dependant upon oxidizing, evaporating or chemical action.
  4. Sealant Gasket shall conform to Federal Specification SS-S-210.
  5. Sealant gaskets shall be RAM-NEK as manufactured by K.T. Snyder Company, Inc. of Houston, TX; QUIKSEAL as supplied by Associated Concrete Products, Santa Ana, CA; or approved equal.
- H. External Precast Vault Joint Sleeves –
1. Joint sleeves shall be heat-shrinkable sleeves constructed of irradiated and cross-linked polyethylene impermeable backing coated with protective heat-activated adhesive.
  2. Joint sleeves shall be capable of bonding to primed concrete, metal, and fiberglass surfaces.
  3. Joint sleeve material shall be compatible with concrete, steel, iron, and fiberglass.
  4. Joint sleeves shall be supplied with a separate closure seal to secure sleeve in place during installation and seal overlap area.
  5. Joint sleeve primer of the same manufacturer as the joint sleeve material shall be provided to prime concrete and steel surfaces prior to joint sleeve installation.
  6. Joint sleeves shall be WrapidSeal Manhole Encapsulation System as manufactured by Canusa, Division of Shaw Resource Services, Inc. of The Woodlands, TX.; or approved equal.
- I. Adhesive Doweling Accessories –
1. Accepted products include:
    - a. ITW-Ramset Epcon system with “Ceramic 6” polymer adhesive
    - b. Hilti HVA adhesive anchor system with HEA adhesive capsule



## SECTION 03300 – CAST-IN-PLACE & PRECAST CONCRETE

- c. Hilti HAS threaded rods in Hilti C-100 adhesive
- 2. Adhesive dowels shall have minimum embedment of 12 bolt diameters, unless noted otherwise on drawings. The hole diameter and roughness shall be per manufacturer's instructions; thoroughly clean hole before installation.

### PART 3. EXECUTION

#### 3.01 EXAMINATION

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

#### 3.02 CAST-IN-PLACE CONCRETE - INSTALLATION

- A. Install in accordance with "Quality Assurance" provisions, "References," Specifications, and Manufacturer's directions. Where these may be in conflict, the more stringent requirements govern.
- B. Bar detailing not shown otherwise on drawings shall comply with the CRSI Manual of Standard Practice.
- C. Forms shall be constructed of well fitted and leak-proof materials so that fins or voids are not created in the finished work.
- D. Lap all bars 40 diameters unless shown otherwise on the drawings. Bars parallel to the line of the wall shall be continuous, i.e. lapped or with corner "L" bar laps, or otherwise terminated at the ends of the wall with 6" x 90 degree hooks.
- E. Support reinforcing bars on chairs or other purpose-made devices so that they are securely held in place and maintain tolerances during placement and consolidation of concrete.
- F. All work associated with the manufacture, transport, and placement of concrete shall comply with References listed in Section 1.4 of this specification section.
- G. Cast-in-Place Appurtenances and Pipe Connections
  - 1. Contractor to plan for and accommodate any embedded items such as wall pipe, railings, ladders, hatches etc. which are not or may not be suitable for subsequent installation into cured concrete.
- H. Finishing Concrete:
  - 1. General: Vibrate to compact, screed, level, and tamp with a grid tamper to raise a thin mortar bed to the surface. Trowel after concrete has hardened sufficiently to prevent drawing moisture to the surface. Do not dust with dry materials.
  - 2. Interior Floor Slabs: Steel trowel and install joints straight and true. Do not apply curing compounds. Damp cure only. Slope concrete slabs with Portland Cement Grout 1/8" per foot to sumps or as indicated on plans. Apply slip-resistant rake finish to wetwell bottoms.
  - 3. Sidewalks, Exterior Slabs on Grade and Curbs: Steel trowel and medium broom finish.
  - 4. Exterior and Interior Exposed walls: Defective work repaired, fins removed, and all offsets and projection ground smooth, and shall have all depressions 1/16-inch

## SECTION 03300 – CAST-IN-PLACE & PRECAST CONCRETE

or larger in depth or width filled with mortar, and tie holes filled. The mortar shall consist of 1 part cement and 1-1/2 parts fine (passing No. 100 screen) mixed with enough water and an emulsified bonding agent to have the consistency of a thick cream. The surfaces shall be brush sandblasted prior to filling holes to expose all holes near the surface. Thoroughly wet surfaces and rub mortar on with burlap, sponge rubber floats, or trowels while surface is damp. Wipe surface clean and moist cure.

I. Curing Concrete:

1. All structural concrete shall be moist cured for a minimum of 90 days, unless otherwise instructed by Engineer.

J. Tolerances: Interior and exterior Slabs, 1/4 inch in 10 feet.

### 3.03 PRECAST CONCRETE STRUCTURES - INSTALLATION

- A. Set precast vault sections in a concrete base joint groove, formed in the cast-in-place concrete base slab.
- B. Apply primer to joint surfaces in accordance with manufacturer's instructions. Make all joints watertight with sealant gaskets.
- C. Apply primer and heat-shrinkable joint sleeves in accordance with manufacturer's instructions. Ensure surfaces are clean, dry, and free of frost, surface rust, foreign objects, sharp edges, and projections that could damage manhole encapsulation system. The Contractor shall provide a minimum of 3-days notice prior to the beginning application of the joint sleeves. Joint sleeve installer shall be experienced with the required installation techniques and have attended a minimum of 1 day of training at the manufacturer's facility or on-site with manufacturer's representative.
- D. Type 3 Manhole Base to be set on a minimum 12-in thick layer of structural fill compacted to 95% of relative density. Backfill around the wetwell with gravel backfill material. Compact the backfill material to 95% of relative density from the pipe bedding and base slab up to final finish grade, over an area defined as being within a distance of 4 feet from the exterior walls of the vault.
- E. Accurately locate vault frames to within 1/8-inch vertical elevation in paved areas and to 1/2-inch in other areas. Coordinate the activities of all trades so that this tolerance is achieved.
- F. Install the vault hatch and frame. Machine the hatch as necessary to obtain a solid fit, without rattling under load.

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

## **SECTION 04200 - MASONRY**

### **PART 1 – GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes: Concrete masonry units, mortar, grout and reinforcing steel to repair portions of the existing masonry structure as identified on the plans.

#### **1.02 DEFINITIONS**

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells. Note that all unit masonry to be built on this job shall be reinforced and all cells grouted solid.

#### **1.03 PERFORMANCE REQUIREMENTS**

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days, per the Structural Notes.

#### **1.04 ACTION SUBMITTALS**

- A. Shop Drawings: For the following:
  - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes. All units shall be split block, with one side (inside) smooth faced, as well as all edges smooth faced.
  - 2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement" Show elevations of reinforced walls.
- B. Samples for Initial Selection:
  - 1. Split-face CMU, flat one sided (inside) and rough one side (outside) with flat ends.
  - 2. Submit samples for approval of texture and color.
- C. Material Certificates: For each type and size of the following:
  - 1. Masonry units.
    - a. For masonry units, include data and calculations establishing average net-area compressive strength of units.
  - 2. Cementitious materials. Include brand, type, and name of manufacturer.
  - 3. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.
  - 4. Grout mixes. Include description of type and proportions of ingredients.

## SECTION 04200 - MASONRY

5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.
8. Mix Designs: For each type of mortar and grout, include description of type and proportions of ingredients.
  - a. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
  - b. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- E. Cold-and-Hot weather procedures: Per IBC requirements, including referenced standards.

### 1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

## SECTION 04200 - MASONRY

- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

### 1.07 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions.
  - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in the IBC, including referenced standards.

## **SECTION 04200 - MASONRY**

### **PART 2 - PRODUCTS**

#### **2.01 MASONRY UNITS, GENERAL**

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

#### **2.02 CONCRETE MASONRY UNITS**

- A. Shapes: 8"x4"x16" standard open cell brick. Basalite Concrete Products Ground Face CMU, or approved equal.
- B. Match existing color of pump stations. Submit color to City for final approval.

#### **2.03 REINFORCEMENT**

- A. Uncoated Steel Reinforcing Bars: ASTM A 615, Grade 60.

#### **2.04 MASONRY CLEANERS**

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

## SECTION 04200 - MASONRY

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Diedrich Technologies, Inc.
  - b. EaCo Chem, Inc.
  - c. ProSoCo, Inc.

### 2.05 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
  1. Do not use calcium chloride in mortar or grout.
  2. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a pre-blended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Type N, comply with ASTM C 270.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color to match block. Do not add pigments to colored cement product.
  1. Pigments shall not exceed 10 percent of portland cement by weight.
  2. Pigments shall not exceed 5 percent of masonry cement by weight.
- E. Grout for Unit Masonry: Comply with ASTM C 476 and the Structural Notes.

## **SECTION 04200 - MASONRY**

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
  - 2. Verify that foundations are within tolerances specified
  - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.02 INSTALLATION, GENERAL**

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- D. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
  - 1. Mix units from several pallets or cubes as they are placed.



## SECTION 04200 - MASONRY

### 3.03 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  - 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  - 4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
  - 5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
  - 6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

## **SECTION 04200 - MASONRY**

### **3.04 MASONRY WASTE DISPOSAL**

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
  - 1. Crush masonry waste to less than 4 inches in each dimension.
  - 2. Mix masonry waste with at least two parts of approved specified fill material for each part of masonry waste.
  - 3. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

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

## **SECTION 07100 – MEMBRANE ROOFING**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Work includes providing and installing the roof membrane system including but not limited to insulation panels, roof board, PVC membrane, adhesive, and flashing, (as noted herein and shown on the drawings):

#### **1.02 QUALITY ASSURANCE**

- A. This roofing system must be installed by a manufacturer authorized installer in compliance with the Contract Documents and the manufacturer's recommendations.
- B. Upon request, an inspection shall be conducted by a Field Service Representative of roofing manufacturer to ascertain that the membrane roofing system has been installed according to published specifications and details applicable at the time of bid. This inspection is to determine whether a warranty shall be issued. It is not intended as a final inspection for the benefit of the owner.

#### **1.03 SUBMITTALS**

- A. Submit under provisions of Section 01300. Manufacturer's standard details and catalog data demonstrating compliance with referenced standards; include manufacturer's standard installation instructions. Submit warranty documents, properly executed.
- B. Shop drawings must be submitted to the manufacturer by the authorized roofing contractor along with a completely executed Job Approval Request for approval. Approved shop drawings are required for inspection of the roof and on projects where on-site technical assistance is requested.

#### **1.05 WARRANTY**

- A. Completed roof system shall have a 25-year warranty. Contractor shall comply with any flashing enhancement required by the manufacturer to achieve a 25-year warranty standard.

#### **1.06 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials to the job site in the original, unopened containers labeled with the manufacturer's name, brand name and installation instructions.
- B. Store membrane, insulation, and roof board on provided pallets in original undisturbed plastic wrap.
- C. Job site storage temperatures in excess of 90°F may affect shelf life of curable materials (i.e., adhesives and sealants).
- D. When liquid adhesives and sealants are exposed to lower temperatures, restore to a minimum of 60°F before use.

## **SECTION 07100 – MEMBRANE ROOFING**

- E. Do not store adhesive containers with opened lids due to loss of solvent, which will occur from flash off.

### **PART 2 - MATERIALS**

#### **2.01 GENERAL**

- A. The components of this roofing system are to be products of Versico or accepted by Versico as compatible, (approved equals shall only be evaluated as complete Manufacturer Systems).

#### **2.02 MEMBRANE ROOF SYSTEM - COMPONENTS**

- A. Roof Membrane – Versico VersiFlex (white, gray or tan – City to choose color) 80-mil reinforced Polyvinyl Chloride (PVC) membrane.
- B. Roof Insulation – Versico MP-H Polyiso Rigid Roof Insulation (1-in thick).
- C. Roof Board – Versico Densdeck Roof Board (1/4-in thick).
- D. Adhesive – Versico Versiflex Low-VOC Bonding Adhesive.
- E. Flashing –
  - 1. Membrane Flashing – Versico Versiflex PVC reinforce membrane at all walls and curbs. Non-Reinforced membrane shall be limited to inside and outside corners, field fabricated pipe seals, scuppers and sealant pockets where the use of pre-molded accessories are not practical.
  - 2. Perimeter Metal Roof Flashing – Existing perimeter metal roof flashing shall be replaced in kind with a baked on enamel finish in a color of the Owner's choosing.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION SEQUENCE**

- A. Roof System Installation Sequence – Commencing from the cleaned concrete roof surface:
  - 1. Adhesive Layer – Applied to clean concrete roof surface.
  - 2. Roof Insulation followed by an adhesive layer applied to the top of the insulation.
  - 3. Roof Board followed by an adhesive layer applied to the top of the roof board.
  - 4. Roof Membrane.
  - 5. Flashing shall be installed in accordance with the manufacturer's instructions at the appropriate point in the sequence so as to achieve an overall waterproof system.

## **SECTION 07100 – MEMBRANE ROOFING**

### **3.02 GENERAL**

- A. When feasible, begin the application at the highest point of the highest roof level and work to the lowest point to prevent moisture infiltration and to minimize construction traffic on the completed sections. This includes completion of all flashings, terminations and daily seals.

### **3.03 SUBSTRATE PREPARATION**

- A. Clean concrete roof surface of all debris, foreign matter, adhesive, and old membrane roofing. Patch all divots in concrete surface.

### **3.04 INSTALLATION**

- A. Roof Insulation and Roof Board -
  - 1. Secure roof insulation and roof board with adhesive using full spray coverage or beads with spacing as outlined in the manufacturer's technical manual.
- B. Membrane Installation and Heat Welding -
  - 1. Position membrane over roof board and fold membrane back so half of the underside is exposed.
  - 2. Apply adhesive to the underside of the exposed membrane and the corresponding roof board area with a plastic core medium nap paint roller at the appropriate coverage rate.
  - 3. Allow adhesive to dry and roll coated membrane into coated substrate. Avoid wrinkling.
  - 4. Brush down the bonded section of membrane immediately with a soft bristle push broom.
  - 5. Fold back the unbonded half of the sheet and repeat the bonding procedure.
  - 6. Install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches to provide for a minimum 1-1/2" hot air weld.
  - 7. Heat weld the membrane sheet a minimum of 1-1/2" with an Automatic Heat Welding Machine.
- C. Additional Membrane Securement -
  - 1. The membrane must be secured at the perimeter of each roof level, roof section, expansion joint, curb, skylight, and at any angle which exceeds 2" per horizontal foot and at all other penetrations in accordance with the manufacturer's published details.
- D. Membrane & Metal Flashing
  - 1. Install membrane flashing in accordance with manufacturer recommendations and details.

## **SECTION 07100 – MEMBRANE ROOFING**

2. Replace existing perimeter metal flashing in kind.

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

## **SECTION 08100 – METAL DOORS AND FRAMES**

### **PART 1. GENERAL**

#### **1.01 SUMMARY**

- A. Provide metal doors and frames as indicated on the Plans.
- B. Products Installed but not Furnished Under this Section: Finish Hardware specified in Section 08700.

#### **1.02 REFERENCES**

- A. American Society for Testing and Materials (ASTM).
  - 1. A 366 "Specification for Steel, Carbon, Cold Rolled Sheet, Commercial Quality."
  - 2. A 526 "Specification for Steel Sheet, Zinc Coated (Galvanized) by the Hot Dip Process, Commercial Quality."
- B. Steel Door Institute (SDI).
  - 1. 100 "Recommended Specifications, Standard Steel Doors and Frames."
  - 2. 105 "Recommended Erection instructions for Steel Frames."
  - 3. 107 "Hardware on Steel Doors (Reinforcement Application)."

#### **1.03 QUALITY ASSURANCE**

- A. Qualifications: Comply with SDI Publication, 100.

### **PART 2. PRODUCTS**

#### **2.01 MATERIALS**

- A. Doors: Commercial quality cold rolled, sheet steel in conformance with ASTM A 366. Stretcher level steel for door faces. Hot dip galvanized steel for exterior doors in conformance with ASTM A 526, G90 coating designation, factory baked on primer.
- B. Hardware: Comply with SDI 107. Furnished as specified in Section 08700.

#### **2.02 FABRICATION**

- A. Exterior Insulated Hollow Metal (INS HM) Doors:
  - 1. Type: Standard-duty, full flush panel, in accordance with SDI 100 for Grade II, Model 1 door with a polyurethane core.
  - 2. Steel Grades: 16 gauge minimum, galvanized face sheets
- B. Frames: One piece, welded, 16 gage minimum, galvanized, with integral stops, jambs, and trim in accordance with SDI 100 for Grade II, Model 2 doors.

## **SECTION 08100 – METAL DOORS AND FRAMES**

### **PART 3. EXECUTION**

#### **3.01 INSTALLATION**

- A. Install in accordance with SDI 105, manufacturer's recommendations, and requirements of labeling authority.
- B. Install hardware, adjust, and lubricate for proper operation.
- C. Provide punch & dimple masonry anchors suitable for fastening the door frame to the existing masonry wall.

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



## SECTION 08600 – SKYLIGHTS

### PART 1 -GENERAL

#### 1.01 SECTION INCLUDES

- A. This section covers all work necessary for the execution and completion of skylight(s) as shown on drawings and specified herein.
- B. Work includes but is not limited to the following: design, fabrication, glazing, and erection of skylight(s) as required for a complete and watertight installation.

#### 1.02 REFERENCE

- A. American Architectural and Manufacturers Association
  - 1. AAMA/WDMA/CSA/101/I.S. 2/A440-05 North American Fenestration Standard/Specification for windows, doors, and skylights. (includes standard test methods for air infiltration, water penetration, structural loading)
  - 2. AAMA 603.8-92 Pigmented Organic Coating on Extruded Aluminum
  - 3. AAMA 611 - Voluntary Standards for Anodized Architectural Aluminum
  - 4. ASTM A 193 / A 193M - 08b Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications\
- B. American Standards and Test Methods
  - 1. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
  - 2. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Profiles
  - 3. ASTM D 1667 - 05 Standard Specification for Flexible Cellular Materials - (Closed-Cell Foam)
- A. International Building Code 2006

#### 1.03 DESIGN REQUIREMENTS

- A. Unit skylights are certified by National Accreditation & Management Institute and rated by the National Fenestration Rating Council (NFRC) for thermal performance. VT tested values for domes are not certified due to NFRC limitations.
  - 1. Clear Acrylic Double Dome
    - a. U-Factor: 0.68
    - b. SHGC: 0.75
    - c. VT: 0.73
- B. Unit skylights are certified by National Accreditation & Management Institute to North American Fenestration Standard/Specification (NAFS) [AAMA/WDMA/CSA 101/I.S.2/A440] for air and water penetration and structural loading - as required by the International Building Code, section 2405.5 Unit Skylights.
  - 1. Acrylic Dome
    - a. MST: SKP-C30 50" x 50"
    - b. Design Pressure (Download): 45 psf
    - c. Negative Design (Uplift): 30 psf
    - d. Water Resistance: 6.0 psf

#### 1.04 SUBMITTALS

- A. Submit under provisions of Section 01300. Manufacturer's standard details and catalog data demonstrating compliance with referenced standards; include manufacturer's standard installation instructions. Manufacturer's product drawings showing details of

## SECTION 08600 – SKYLIGHTS

fabrication, hardware, weather stripping, fasteners, screens, glazing, accessories, and related items. Warranty documents, properly executed.

### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original and unopened packaging with parts manifest.
- B. Store on site in a location and manner to avoid damage. Stacking should be done in a manner that will prevent damage. Store material in a clean, dry location away from high traffic areas. Any protection on the skylights during transportation should remain until installed.
- C. Keep handling on site to a minimum. Exercise caution to avoid damage to finishes of material.

## PART 2 – PRODUCTS

### 2.01 MANUFACTURER & MODEL

- A. Acceptable Manufacturer & Model: Crystalite Series 5842 Double Dome with 90° Curb, or equal.

### 2.02 MATERIALS

- A. Aluminum.
  - 1. Aluminum extruded components shall be alloy 6063-T5 or 6063-T6, of sufficient thickness for this application, and as required per structural calculations; ASTM B 221.
  - 2. Aluminum sheet and plate shall be alloy 5052-H32 per ASTM B 209.
- B. Glazing Materials
  - 1. Acrylic sheet. Shall be used in all heat formed dome and pyramid shaped skylights. Color shall be (clear, bronze, grey). Thickness as required by the span and loads. Class CC2 Fire Rating
    - a. Plaskolite Optix White Acrylic Sheet has a measured haze value greater than 90%.
  - 2. Polycarbonate multi-wall sheet. Color shall be white. Thickness as required by the span and loads. Fire Rating per application.

### 2.03 FINISHES

- A. Class II color anodic finish per AA\_M12C22A32/A34 complying with AAMA 611. Mechanical finish non-specular as fabricated. Chemical finish etched medium matte. Anodic coating architectural Class II integrally colored or electrolytically deposited color coating 0.4 mil or thicker

### 2.04 FASTENERS

- A. Exterior fasteners and fasteners exposed to wet areas in frame shall be 300 series stainless steel per ASTM 193/A 193M, except pop rivets used on glazing cap are aluminum or stainless steel per manufacturer.
- B. Dry area fasteners shall be cadmium-plated steel per ASTM F 1135 or stainless steel.
- C. All welding shall be by the TIG process. All exposed welds to be finished to match frame color where practical.

### 2.05 GLAZING ACCESSORIES

## **SECTION 08600 – SKYLIGHTS**

- A. Glazing tapes per ASTM D 1667, 2240, 3575. All other gaskets, setting blocks, and other materials used in glazing shall be of a type, quality and compatibility to provide performance of the skylight(s) covered in this section.
- B. Silicone sealant per CAN/CGSB 19.13-M87; TT-S-001543A/ASTM C 920, Type S, NS, Class 25 use NT, G, A&O test requirements.

### **2.06 FABRICATION**

- A. Skylight(s) shall be factory fabricated and preassembled in largest size assemblies possible with considerations for shipping and jobsite handling.
- B. Skylight(s) shall have properly designed weep systems for drainage to exterior.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Framing shall be installed and glazed by experienced workmen in accordance with the approved shop drawings, manufacturer's instructions and glazing standards.
- B. Verification of Conditions: Openings are in correct location, and of correct size, in accordance with approved shop drawings and manufacturer's installation instructions. Installer shall examine conditions under which construction activities of this section are to be performed. Correct unacceptable conditions prior to installation.

### **3.02 CLEANING AND PROTECTION**

- A. Subsequent to installation of skylight(s) the General Contractor shall be responsible for the cleanup and protection of all materials provided per this section, including, but not limited to glazing materials and framing members. No abrasive materials of any kind shall be used in cleaning of skylight surfaces.

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



## **SECTION 08700 – FINISH HARDWARE**

### **PART 1. GENERAL**

#### **1.01 SUMMARY**

- A. Description: Work under this section includes the complete finish hardware requirements for the project. Quantities listed are for the contractor's convenience only and are not guaranteed. Items not specifically mentioned but necessary to complete the work shall be furnished, matching the items specified in quality and finish.
- B. The Contractor shall be responsible for proper operation and fitting of hardware in locations specified. Exposed surfaces of hardware shall be covered and well protected during installation so as to avoid damage to finishes.
- C. Work not Included: Hardware not included in this division but specified elsewhere:
  - 1. Metal Doors and Frames - Section 08100.

#### **1.02 QUALITY CONTROL**

- A. Supplier: Finish hardware shall be supplied by recognized builders' hardware supplier who has been furnishing hardware in the same area as the project for a period of not less than two years.
- B. Codes:
  - 1. All finish hardware shall comply with applicable local and state current building codes.
  - 2. Provide hardware which meets or exceeds handicapped accessibility per local and state building code requirements.

#### **1.03 SUBMITTALS**

- A. Manufacturer's Data: Submit copies of manufacturer's data for each item of finish hardware with each hardware schedule submitted per Section 01330 - Submittals.
- B. Hardware Schedule: Submit final hardware schedule in manner indicated below. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware. Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
  - 1. Type, style, function, size and finish of each hardware item.
  - 2. Name of manufacturer of each item.
  - 3. Fastenings and other pertinent information.
  - 4. Location of hardware set cross referenced to indications on drawings both on floor plans and in door and frame schedules.
  - 5. Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
  - 6. Recommended mounting locations for hardware.
- C. Submittal Sequence: Submit copies of schedule at earliest possible date in accordance with requirements in Division -1, particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the

## **SECTION 08700 – FINISH HARDWARE**

coordinated review of hardware schedule.

- D. Keying Schedule: Submit separate detailed schedule indicating how the owner's final instructions on keying of locks has been fulfilled.
- E. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory or shop prepared for the installation of hardware. Upon request, check shop drawings of other work, to confirm that adequate provisions are made for proper location and installation of hardware.

### **1.04 PRODUCT HANDLING**

- A. Tag each item or package separately, with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- B. Packaging of hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set number of approved hardware schedule. Two or more identical sets may be packed in the same container.
- C. Inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- D. Delivery individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.

### **1.05 GUARANTEE**

- A. Finish hardware shall be guaranteed against defects in workmanship and operation for a period of one year, backed by a factory guarantee of the hardware manufacturer, except that door closers shall be so guaranteed for five years. No liability shall be assumed by the hardware supplier where faulty operation is due to improper installation or failure to exercise normal maintenance.

## **PART 2. MATERIALS**

2.01 MANUFACTURERS: See PART FOUR HARDWARE SCHEDULE.

### **2.02 MATERIALS AND FABRICATION GENERAL:**

- A. Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
- B. Manufacturer's Name Plate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable name plates), except in conjunction with required UL or FM labels and as otherwise acceptable to the Architect. Manufacturer's identification will be permitted on rim of lock cylinders and latch faceplates only.
- C. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI A156 series standard for each type hardware item and with ANSI A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.
- D. Fasteners: Provide hardware manufactured to conform to published templates, generally

## SECTION 08700 – FINISH HARDWARE

prepared for machine screw installation. Do not provide hardware which has been prepared for self tapping sheet metal screws, except as specifically indicated.

- E. Furnish screws for installation, with each hardware item. Provide Phillips flat head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finishes of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.
- F. Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or not on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provides leaves for each thru-bolt or use sex screw fasteners.
- G. Tools and Maintenance Instructions for Maintenance: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of finish hardware.

### 2.03 LOCKSETS AND LATCHSETS

- A. Key-in-knob type, steel cylindrical case with interior parts plated to resist corrosion, with access to cylinder without removal from the door, 2-3/4" backset. Design as specified.
  - 1. Strikes: Standard strikes sized to extend no more than 3/16" beyond door frame or adjacent trim.
  - 2. Keying: Keyed and registered at the factory, 6 pin cylinders, master keyed, keyed alike conforming to City of Ferndale standard. All keys shall be tagged with room or door identification and delivered by the manufacturer direct to the Owner.

### 2.04 CLOSERS

- A. Full rack and pinion construction with tamperproof valves to control closing, latching, and backcheck. Furnish proper mounting hardware to suite installation conditions, including all required screws or bolts. Provide thru bolts at wood doors with carriage heads exposed. Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending on the size of the door, exposure to weather and anticipated frequency of use. Where parallel arms are indicated for closers, adjust closer unit one size larger than recommended for use with standard arms. Provide arms for closers which allow the closer to be mounted on the room side, unless otherwise noted. Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force. Fire protection has precedence over handicapped compatibility, check with local jurisdiction.

### 2.05 WEATHER STRIPPING:

- A. General: Except as otherwise indicated, provide continuous weather stripping at each edge of every exterior door leaf. Provide type, sizes and profiles as indicated as drawn or scheduled. Provide non-corrosive fasteners as recommended by the manufacturer for applications indicated.
- B. Perimeter weather strip: Flexible, hollow neoprene bulb or loop insert, conforming to MIL R 6055, Class II, Grade 40.

### 2.06 KICK, MOP AND ARMOR PLATES

## **SECTION 08700 – FINISH HARDWARE**

- A. Plastic, 1/8" thick, laminated double face balance construction, color as selected. Metal: Minimum 0.050 inch thick, finish as specified. Furnish and widths as required to provide 1/4" clearance at sides of doors and stops, heights as specified. Furnish oval head mounting screws and mounting adhesive as recommended by manufacturer.

### **2.07 STOPS AND HOLDERS**

- A. Exterior Doors:

All exterior doors are to be equipped with heavy duty stainless steel latching door stops, which include door stop, holder, hook, ring, and door plate. See exterior door stop detail, sheet C8.1. (Ives Model FS446, Contact Sargent Manufacturing Company, Doug Holderman 425-392-2358)

### **2.08 DOOR SILENCERS**

- A. Furnish three for each single door frame.

### **2.09 FINISHES**

- A. All items, unless otherwise specified, US26D Dull Chrome. Exposed closers, factory finished, US26D or spray painted aluminum to match adjacent hardware.

### **2.010 THRESHHOLDS**

- A. Furnish for each door opening.

## **PART 3. EXECUTION**

### **3.01 PREPARATION**

- A. Provide solid blocking for all wall stops. Check all conditions and use fastening devices as needed to securely anchor all hardware as per manufacturer's published templates. Self-tapping sheet metal screws are not acceptable. All closers and exit devices on wood doors shall be thru-bolted.

### **3.02 INSTALLATION**

- A. Mounting heights: Mount units at heights recommended in "Recommended Locations for Builders' Hardware" by NBHA, except as otherwise indicated or as required by State Barrier Free regulations.
- B. Install each hardware item in compliance with the manufacturer's instructions. Wherever cutting and fitting are required to install hardware on surfaces which will be painted or finished at a later time, install each item completely and then remove and store in a secure place. After completion of the finishes, re-install each item. Do not install surface-mounted items until finishes have been completed on the substrate.
- C. Adjust and check each operating item of hardware and each door to insure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units which are not factory prepared for fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set thresholds for exterior doors in a full bed of butyl-rubber or polyisobutylene mastic sealant.



## SECTION 08700 – FINISH HARDWARE

### 3.03 HARDWARE LOCATIONS

- A. The following shall be used in absence of other specifications from door manufacturers:
- Center of knob at Rail & Stile: Center on Mid Rail
  - Center of knob to finished floor: 36"
  - Bottom butt: bottom of door to bottom of butt: 10"
  - Top butt - top of door to top of butt: 5"
  - Center butt: equals distance between top and bottom butts.

### 3.04 ADJUSTMENT

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Wherever hardware installation is made more than one month prior to acceptance or occupancy, make a final check and adjustment of all hardware items during the week prior to acceptance of occupancy. Clean and lubricate operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- C. Clean adjacent surfaces soiled by hardware installation.
- D. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the acceptance of hardware in each area, the installer, accompanied by the representative of the lock and latch manufacturer, shall return to the project and re-adjust every item of hardware to restore proper function of doors and hardware. Consult with an instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

### 3.05 SPECIAL TOOLS

- A. Contractor shall provide 2 sets of any special tools required for installation and maintenance of hardware.

## PART 4. HARDWARE SCHEDULE

### 4.01 MANUFACTURERS

- A. Each hardware symbol is followed by the model number of the first manufacturer listed for the item, unless otherwise identified. Such designation is intended to establish a standard of quality, function, and appearance for the various finish hardware items.

Manufacturer Specified	Approved Substitutions
Stanley	Hager, McKinney, Lawrence
Best	None
Ives	Quality, Rockwood
Tice	Quality, Rockwood
Pemko	National Guard, Reese

## SECTION 08700 – FINISH HARDWARE

### 4.02 HARDWARE GROUPS (Note: Confirm active door size before ordering doors/hardware)

#### Hardware Group #1 - (insulated hollow metal doors - exterior single doors)

1-1/2 pr Hinges	Stanley FBB199 4-1/2x4-1/2 NRP
1 ea Lockset	Latchbolt by key outside or by grip either side, unless outside grip is locked by toggle-action stop. Auxiliary latch deadlocks latch-bolt. Inside grip always free. Corbin Russwin ML2000 Series Grade Mortise Locksets with Lustra Lever Trim and Escutcheon Plate (satin chrome), include Russwin Mortise Cylinders. Keyway to match City Standard.
1 set Flushbolts	Ives 458-26D manual flush bolts
1 ea Dust Proof Strike	Ives DP2 (US26D)
1 ea Closers	Sargent 421 Series
1 ea Kickplate	PLKP 10x2" LD CAS
1 ea Astragal	Pemko 357SP
1 ea Gasketing	Pemko S88D
1 ea Door Bottom Sweeps	Pemko 315SN
1 ea Threshold	National Guard 713
1 ea Exterior Stops & Holders	Ives Model FS446

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

## SECTION 09900 - PAINTING

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. Description of System: The work covered by this section consists of furnishing all labor, equipment and materials necessary for the preparation and application of the paint coatings as specified herein.
- B. Excludes **Service Condition A**, as outlined in Specification Section 09910.

#### 1.02 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Comply with the requirements of agencies having jurisdiction over this section of work, including, but not limited to:
    - 1. WISHA, Washington Industrial Safety and Health Act.
  - B. Reference Standards: All surface preparation, coating and painting shall conform to the applicable requirements of the:
    - 1. National Association of Corrosion Engineers
    - 2. Steel and Structures Painting Manual, Volume 2, Systems and Specifications (latest revision) published by the Steel Structures Painting Council (SSPC).
    - 3. American Water Works Association (AWWA) Standard D102 "Painting Steel Water Storage Tanks."
  - C. Manufacturer: Manufacturer shall be of established good reputation and shall have regularly engaged in the manufacture of such coatings for a minimum of 5 years. This experience shall include a minimum of 20 similar applications in which such coatings have proven satisfactory service for a minimum of 3 years.
  - D. Contractor: Contractor shall have 5 years of practical experience and successful history in the application of paint coatings to surfaces of municipal or industrial type equipment.
  - E. Paint Film Thickness: All painted surfaces will be inspected by the Contractor with approved wet-film thickness gages. Inspection will include the thickness measurement of each prime and finish coat.
  - F. Manufacturer's Representative: The manufacturer shall provide a qualified representative to visit the site from time to time during the paint operations as requested by the Engineer. The manufacturer's representative shall assist the Engineer in monitoring surface preparation and paint application.
- #### 1.03 SUBMITTALS
- A. Submittals detailing product data and application procedures shall be submitted in accordance with Section 01300 for each paint service condition.

## **SECTION 09900 - PAINTING**

- B. Color charts for each of the finish coats listed in Part II of this section shall be submitted at least thirty (30) days prior to the starting of painting.
- C. A Schedule of the Painting Work shall be submitted to the Engineer at least fourteen (14) days prior to commencing of any work under this section. A revised schedule shall be submitted as requested by the Engineer to reflect changes or delays in the work.

### **1.04 JOB CONDITIONS**

- A. Environmental:
  - 1. Protective coatings shall not be applied in areas where dust is being generated or in any other areas where disturbances will affect the quality of the work.
  - 2. The Contractor shall comply with the manufacturer's recommendations as to environmental conditions (i.e. temperature, moisture, exposure to sunlight etc.) under which coatings and coating systems must be applied and cured.
- B. Protection: The Contractor shall be responsible for protecting coatings or coating systems from any disturbances during or after application which will affect the quality of the work.

### **1.05 DELIVERY AND STORAGE**

- A. Delivery: All products shall be delivered in sealed containers with labels legible and intact. Labels shall include the following information: Manufacturer's name and stock number, type of paint or protective coating, color, instructions for reducing, label analysis, and federal specification number.
- B. Storage: Products shall be stored in a single location and in a manner complying with all applicable safety, health and fire regulations.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL**

- A. Surfaces to receive insulation or other protective materials shall be coated or painted in conformance with the applicable Service Conditions as specified herein.  
The intent has not been to identify each and every item to be coated, but only to list the major items. In no case shall any wood, ferrous metal or other surface, requiring protection, be left uncoated or unpainted.
- B. The products specified are those which have been evaluated for the specific service and are given to establish a quality standard for that service. Products of other manufacturers comparable in quality and type to those specified will be acceptable if said paints are offered by the Contractor with satisfactory data on past performance in similar applications. Requests for substitutions shall be in accordance with Section 01600.
- C. The Contractor shall use products of the same manufacturer for all prime and finish coats listed in each separate Service Condition.
- D. Colors to be used shall be as designated by the Owner based upon the color charts provided by the Contractor.

## **SECTION 09900 - PAINTING**

- E. For the paint thickness listed under each Service Condition:
  - 1. WT = wet-film thickness in mils
  - 2. DF = dry-film thickness in mils
  - 3. The number following equals the minimum film thickness required, per coat.
  - 4. Putty: Conform to FS TT-P-791A(3), colored to match paint and stain finishes, as applicable.
- G. Cementitious Filler: Nonshrink formulation, white Portland cement with fine silicate aggregate, zinc-oxide pigment, and reinforcing chemical binder as approved.
- H. Spackling Compound: Standard gypsum board compound.
- I. Unspecified materials such as turpentine, linseed oil, or mineral spirits shall be products of reputable manufacturers and as recommended by paint manufacturers.
- J. Materials for Undercoats and Finish Coats: Ready mixed, and shall not be changed, except thinning of undercoats (when required), reinforcing, or coloring, all of which shall be performed in accordance with manufacturers' recommendations.

### **SERVICE CONDITION A**

- A. Generic Type: Monolithic high-build epoxy coating. Reference Specification Section 09910.

### **SERVICE CONDITION B**

- A. Generic Type: Modified epoxy phenalkamine formulated specifically for immersion and atmospheric service in marine and industrial environments.
- B. Application: Concrete walls and ceiling as called out on the painting and coating schedule on the plans.
- C. Surface Preparation:
  - 1. "Dry Side" of the stations.
    - a. Pressure wash surfaces,
    - b. Patch all divots, abandoned anchor holes, and other imperfections with Sherwin Williams Dura-Plate 2300 Sacking Material, (or approved equal).
  - 2. "Wet Side" of the stations.
    - a. Sandblast surfaces,
    - b. Coat walls and ceiling with Sherwin Williams Dura-Plate 2300 Sacking Material, (or approved equal), to a thickness of  $>1/16"$ .
- D. Primer – None.
- E. Finish: Two coats of Sherwin Williams Dura-Plate 235, (or approved equal), DF=3.0 (each coat).

## **SECTION 09900 - PAINTING**

### **SERVICE CONDITION C**

- A. Generic Type: High solids, low VOC, alkyd, gloss topcoat.
- B. Application: Doors and door frames.
- C. Surface Preparation: Clean doors and frames of all dust and dirt.
- D. Primer – Factory baked-on enamel.
- E. Finish: Two coats of Sherwin Williams Industrial Enamel HS, (or approved equal), DF=3.0 (each coat).

### **SERVICE CONDITION D**

- A. Generic Type: Modified epoxy phenalkamine formulated specifically for immersion and atmospheric service in marine and industrial environments.
- B. Application: All exposed ferrous metal pipe and miscellaneous ferrous metal items as called out on the painting and coating schedule on the plans.
- C. Surface Preparation: Remove all surface dust, dirt, corrosion, or other foreign substances
  - 1. Atmospheric: SSPC-SP2 or SSPC-SP12/NACE 5, WJ-4,
  - 2. Immersion: SSPC-SP10, 2 mil (50 micron) profile or SSPC-SP-12/NACE 5, WJ-2.
- D. Primer – one coat of Sherwin Williams Zinc Clad II Plus, or approved equal, DF=3.0.
- E. Finish: Two coats of Sherwin Williams Dura-Plate 235, (or approved equal), DF=3.0 (each coat).

### **SERVICE CONDITION E**

- A. Generic Type: Cleaning of existing aluminum stairways, handrails, walkways, and, grating.
- B. Surface Preparation: Remove all surface dust, dirt, corrosion, or other foreign substances
  - 1. “Dry Side” of Stations – Pressure wash,
  - 2. “Wet Side” of Stations – Pressure wash, Perform salt test on aluminum, and then sand blast with garnet.
- C. Primer – None.
- D. Finish – None.

### **SERVICE CONDITION F**

- A. Generic Type: Cleaning and coating of existing concrete floors.

## **SECTION 09900 - PAINTING**

- B. Surface Preparation: Remove all surface dust, dirt, corrosion, or other foreign substances
  1. Pressure wash surfaces and use detergent/solvent cleaners to remove grease and oil
  2. Patch all divots, abandoned anchor holes, and other imperfections with Sherwin Williams Dura-Plate 2300 Sacking Material, (or approved equal).
- C. Primer – None.
- D. Finish – Two coats Dayton Superior “Day-Chem Tuf Seal (J-35)” Chemical/Gasoline & Oil Resistant Sealer w/ H&C “SharkGrip” Slip Resistant Additive, or equal sealer slip-resistant/non-skid system.

### **SERVICE CONDITION G**

- A. Generic Type: Cleaning of all interior and exterior masonry and exterior concrete building base.
- B. Surface Preparation: Pressure wash surfaces and use detergent/solvent cleaners to remove grease and oil.
- C. Primer – None.
- D. Finish – None.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice. The intent of the coating systems is to obtain smooth, clean, dry and well protected surfaces.
- B. All coating and painting shall conform to applicable standards of the National Association of Corrosion Engineers and the Steel Structures Painting Council Manual. Material applied prior to approval of surface by the Engineer shall be removed and reapplied at the expense of the Contractor to the satisfactions of the Engineer.
- C. Dust, dirt, oil, grease or any foreign matter that will affect the adhesion or durability of the finish must be removed by washing with clean rags dipped in a grease solvent and wiped with clean dry rags. Slag and weld metal accumulation and spatters shall be removed by chipping and grinding. All sharp edges shall be peened, ground or otherwise blunted as required by the Engineer.
- D. Painting systems include surface preparations, prime coatings and finish coatings. Unless otherwise specified, prime coat-coatings shall be field applied. Where prime coatings are shop applied, they shall be thoroughly cleaned and touched up in the field as specified.

## **SECTION 09900 - PAINTING**

Any off site work which does not conform to this specification is subject to rejection by the Engineer.

- E. The Contractor's coating and painting equipment shall be designed for the application of the materials specified and shall be maintained in first class working order. The Contractor's equipment shall be subject to approval of the Engineer.
- F. Application of the first coat shall follow immediately after surface preparation and cleaning and within an eight-hour working day. Any cleaned areas not receiving first coat within or right after the first hour period shall be re-cleaned prior to application of first coat.
- G. Prior to assemble, all surfaces that are inaccessible after assembly, shall be prepared as specified herein and shall receive the paint or coating system specified.
- H. Drop cloths shall be used to protect floor and adjoining work from splatter. Any paint surface damaged shall be repaired to the satisfaction of the Engineer before the work will be accepted. The lines formed by changes in color of coatings shall be neat and straight.

### **3.02 COATING SYSTEMS APPLICATION**

- A. All coatings shall be applied in strict accordance with the manufacturer's printed instructions and recommendations.
- B. All coatings shall conform to the film thicknesses as specified in Part 2 of this section. Coatings failing to meet the minimum dry film thickness shall be given additional coats until the minimum film thickness is attained.
- C. Undercoats shall be tinted similar to the finish coats. Each coat shall be slightly darker than the preceding coat.
- D. Each coat applied shall be inspected and approved by the Engineer before application of the succeeding coat.
- E. Allow each coat to dry thoroughly before applying the next coat.
- F. Finish coats shall be uniform in color and sheen without streaks, laps, runs, sags or missed areas.

### **3.03 CONTRACT CLOSE-OUT**

- A. The Engineer shall make a detailed inspection of the paint work upon completion. All damage to surfaces resulting from the work of this section shall be cleaned, repaired or refinished as necessary, at no cost to the Owner.
- B. Upon completion of the work, all paint equipment and materials shall be removed from the site. Coating or paint spots, oil or stains upon adjacent surfaces shall be removed and the job site cleaned.

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



## **SECTION 09910 – CONCRETE PROTECTIVE COATING**

### **PART 1 - GENERAL**

#### **1.01 SURFACES TO BE COATED**

- A. This specification covers work, materials and equipment required for protecting all interior surfaces of the existing concrete wet wells up to the bottom of the existing aluminum walkways at each pump station by spray-application of a monolithic high-build epoxy coating to eliminate infiltration, provide corrosion protection, repair voids and enhance structural integrity. Procedures for surface preparation, cleaning, application and testing are described herein.
- B. This coating system shall constitute Service Condition A in the painting and coating schedule included on the plans.

#### **1.02 SUBMITTALS**

- A. The following items shall be submitted:
  - 1. Technical data sheet on each product used, including ASTM test results indicating the product conforms to and is suitable for its intended use per these specifications.
  - 2. Material Safety Data Sheets (MSDS) for each product used.
  - 3. Project specific guidelines and recommendations.
  - 4. Applicator Qualifications:
    - a. Manufacturer certification that Applicator has been trained and approved in the handling, mixing and application of the products to be used.
    - b. Certification by the protective coating manufacturer that the equipment to be used for applying the products has been approved and Applicator personnel have been trained and certified for proper use of the equipment.
    - c. Five (5) recent references of Applicator (projects of similar size and scope) indicating successful application of a high-build solvent-free epoxy coating by spray application.
    - d. Proof of any necessary federal, state or local permits or licenses necessary for the project.

#### **1.05 QUALITY ASSURANCE**

- A. Applicator shall initiate and enforce quality control procedures consistent with applicable ASTM, NACE and SSPC standards and the protective coating manufacturer's recommendations.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

## **SECTION 09910 – CONCRETE PROTECTIVE COATING**

- A. Materials are to be kept dry, protected from weather and stored under cover.
- B. Protective coating materials are to be stored between 50 deg F and 90 deg F. Do not store near flame, heat or strong oxidants.
- C. Protective coating materials are to be handled according to their material safety data sheets.

### **1.07 SITE CONDITIONS**

- A. Applicator shall conform with all local, state and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.

## **PART 2 - PRODUCTS**

### **2.01 EXISTING PRODUCTS**

- A. Standard Portland cement or new concrete (not quick setting high strength cement) must be well cured prior to application of the protective coating. Generally, 28 days is adequate cure time for standard Portland. If earlier application is desired, compressive or tensile strength of the concrete can be tested to determine if acceptable cure has occurred. (Note: Bond strength of the coating to the concrete surface is generally limited to the tensile strength of the concrete itself.)
- B. Cementitious patching and repair materials should not be used unless their manufacturer provides information as to its suitability for topcoating with an epoxy coating. Project specific submittals and procedures should be provided including application, cure time and surface preparation procedures that permit optimum bond strength with the epoxy coating.

### **2.02 MANUFACTURER**

- A. Raven Lining Systems, Inc., Tulsa, Oklahoma 800-324-2810 or 918-584-2810 or FAX 918-582-4311.

### **2.03 REPAIR MATERIALS**

- A. Repair material shall be Raven 760 High Performance Polymer Concrete (HPPC) sacking material, (or approved equal), applied to cleaned surface to a thickness of 1/8-in.

### **2.04 PROTECTIVE COATING MATERIAL**

- A. Raven Primer 155, (or approved equal), water borne 2-part epoxy primer with a minimum WTF of 8 mils.

## SECTION 09910 – CONCRETE PROTECTIVE COATING

- B. Raven Lining Systems Raven 405 Series epoxy coating system, (or approved equal) - a 100% solids, solvent-free two-component epoxy resin system thixotropic in nature and filled with select fillers to minimize permeability and provide sag resistance.

Product type	Amine cured epoxy
Color	Light Blue
Solids Content (vol %)	100

### 2.05 PROTECTIVE COATING APPLICATION EQUIPMENT

- A. Manufacturer heated plural component spray equipment shall be used in the application of the specified protective coating.

## PART 3 - EXECUTION

### 3.01 ACCEPTABLE APPLICATORS

- A. Protective coating must be applied by a Certified Applicator of the protective coating manufacturer and according to manufacturer specifications.

### 3.02 EXAMINATION

- A. Appropriate actions shall be taken to comply with local, state and federal regulatory and other applicable agencies with regard to environment, health and safety.
- B. Installation of the protective coating shall not commence until the concrete substrate has properly cured and been prepared in accordance with these specifications.
- C. Temperature of the surface to be coated should be maintained between 40° F and 120° F during application. Prior to and during application, care should be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated. Where varying surface temperatures do exist, care should be taken to apply the coating when the surface temperature is falling versus rising.

### 3.03 SURFACE PREPARATION

- A. Applicator shall inspect all surfaces specified to receive a protective coating prior to surface preparation. Applicator shall notify Owner of any noticeable disparity in the surfaces that may interfere with the proper preparation or application of the repair mortar and protective coating.
- B. All contaminants including: oils, grease, unsound or incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.
- C. All concrete that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface or replaced.

## SECTION 09910 – CONCRETE PROTECTIVE COATING

- D. Surface preparation method(s) should be based upon the conditions of the substrate and the requirements of the epoxy protective coating to be applied.

Surfaces to receive protective coating shall be cleaned and abraded to produce a sound concrete surface with adequate profile and porosity to provide a strong bond between the protective coating and the substrate. Contractor shall sandblast surfaces to be coated to between a CSP 3 and CSP 5 level. Detergent water cleaning and hot water blasting may be necessary to remove oils, grease or other hydrocarbon residues from the concrete.

- E. Test prepared surfaces after cleaning but prior to application of the epoxy coating to determine if a specific pH or moisture content of the concrete is required according to manufacturer's recommendations.
- F. All surfaces should be inspected during surface prep and before the repair mortar is applied.

### 3.04 APPLICATION OF REPAIR MATERIALS

- A. Areas where structural steel has been exposed or removed shall be repaired in accordance with the Project Engineer's recommendations.
- B. Repair materials shall meet the specifications contained herein. The materials shall be trowel or spray applied utilizing proper equipment on to specified surfaces. The material thickness shall be specified by the Project Engineer according to Owner's requirements and manufacturer's recommendations.
- C. Cementitious repair materials shall be trowelled to provide a smooth surface with an average profile equivalent to coarse sandpaper to optimally receive the protective coating. No honeycomb surfaces should remain after the final trowel procedure of the repair mortar.
- D. The repair materials shall be permitted to cure according to manufacturer recommendations.
- E. All surfaces should be inspected during and after preparation and before the protective coating is applied.

### 3.05 APPLICATION OF PROTECTIVE COATING

- A. Application procedures shall conform to the recommendations of the protective coating manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment.
- B. The spray equipment shall be specifically designed to accurately ratio and apply the specified protective coating materials and shall be regularly maintained and in proper working order.
- C. The protective coating material must be spray applied by a Certified Applicator of the protective coating manufacturer.

## **SECTION 09910 – CONCRETE PROTECTIVE COATING**

- D. Specified surfaces shall be coated by spray application of a moisture tolerant, solvent-free, 100% solids, epoxy protective coating as further described herein. Spray application shall be to a minimum wet film thickness of >125 mils.
- E. Airless spray application equipment approved by the coating manufacturer shall be used to apply each coat of the protective coating. Air assisted spray application equipment may be acceptable, especially for thinner coats (<10 mils), only if the air source is filtered to completely remove all oil and water.
- F. If necessary, subsequent topcoating or additional coats of the protective coating should occur as soon as the basecoat becomes tack free, ideally within 12 hours but no later than the recoat window for the specified product. Additional surface preparation procedures will be required if this recoat window is exceeded.

### **3.06 TESTING AND INSPECTION**

- A. During application a wet film thickness gage, such as those available through Paul N. Gardner Company, Inc. meeting ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a monolithic coating and uniform thickness during application. The applicator shall supply the gage for use by the Owner's Inspector.
- B. A final visual inspection shall be made by the Inspector and manufacturer's representative. Any deficiencies in the finished coating shall be marked and repaired according to the procedures set forth herein by Applicator.

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



# SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT PURCHASE SPECIFICATION

## PART 1. GENERAL

### 1.01 DESCRIPTION

- A. Supply complete, tested and operating, wastewater pumps and pump accessories as specified herein.
- B. Provide submittals; installation support; coordination with the general contractor, the control system manufacturer, and the control system integrator; start-up services; warranties; spare parts; operation and maintenance manuals; testing records; and any other services required to assist the contractor in providing a complete working installation.
- C. ***Note items in bold which are specifically excluded from the pre-purchase scope. These items shall be provided by the Contractor. Contractor is responsible for all labor and materials required to install the pre-purchased pump equipment to provide a complete pump system.***

### 1.02 SUBMITTALS

- A. The Supplier shall provide submittals which include the following specific information shall be provided:
  - 1. Manufacturer's certified pump curves.
  - 2. Shop Drawing of complete pumping assembly including intake and discharge elbows and mounting frames, (if applicable)
  - 3. Catalog information and cuts.
  - 4. Manufacturer's specifications and equipment drawings.
  - 5. Manufacturer's parts lists, schematic and wiring diagrams.
  - 6. Complete lubrication, maintenance, and operation instructions.
  - 7. ***Control panel submittals including wiring diagram and panel layout.(NOT INCLUDED IN PREPURCHASE SPECIFICATION SCOPE – PANELS & PANEL SUBMITTALS TO BE PROVIDED BY GENERAL CONTRACTOR DURING CONSTRUCTION)***
  - 8. Interconnection wiring showing field wiring.
  - 9. Copy of manufacturer's warranty for pump.
- B. Affidavits: The Supplier shall furnish affidavits from the manufacturer stating that the pumps have been properly installed and tested, and each is ready for full time operation.
- C. Performance Testing: Copies of this factory testing shall be submitted to the Engineer for review and approval PRIOR TO SHIPMENT OF THE PUMPS.

### 1.03 QUALITY ASSURANCE

- A. Field Tests. The pumping units shall be field tested after installation to demonstrate satisfactory operation, without causing excessive noise, vibration, cavitation, or overheating. The field testing shall be performed in the presence of an experience field representative of the manufacturer who shall supervise the startup and checkout of the equipment and who shall certify in writing that the pumps and motors have been properly

## SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT PURCHASE SPECIFICATION

installed, lubricated, adjusted, and prepared for operation.

- B. Performance Testing: Certified non-witnessed factory performance tests in accordance with Hydraulics Institute Standards are required for each pump. Copies of this factory testing shall be submitted to the Engineer for review and approval PRIOR TO SHIPMENT OF THE PUMPS

### 1.04 WARRANTY

- A. In addition to 1 year warranty from date of substantial completion, provide the pump manufacturers guarantee in printed form and previously published as the manufacturer's standard warranty for all similar units manufactured. The prorated guarantee shall cover the pumps against defects in workmanship and material for a minimum of five (5) years or 10,000 hours of operation under normal use and service.

## PART 2. PRODUCTS

### 2.01 PUMP STATIONS - GENERAL

- A. The supplier shall be locally available for onsite response when called within a reasonable time, depending upon the nature of the emergency. The Supplier shall have personnel available 24 hours a day, every day of the year – NO EXCEPTIONS.
- B. The pumps shall be supplied with a 1-year clog-free guarantee from the manufacturer.

### 2.02 WASTEWATER PUMPS

- A. General: Submersible wastewater pumps shall be heavy-duty, submersible, non-clog, centrifugal, quick disconnect sump pumps. The pumps shall be capable of operating in the range of capacity specified on a continuous basis with no detrimental effects to the pump or motor.
- B. Pump Schedule: The pump operating characteristics shall be as follows.

1. Pump Station No. 2 - (three pumps)

a. Service Conditions (gpm @ TDH)

Service Conditions	Q/TDH Minimum	Q/TDH Maximum
1-Pump Operating	1583gpm @ 28.0-FT	1952gpm @ 16.0-FT
2-Pump Operating	2732gpm @ 36.2-FT	2911gpm @ 33.0-FT
3-Pump Operating	3184gpm @ 46.8-FT	3726gpm @ 40.6-FT

- b. Minimum Shutoff Head 84 feet ± 1 ft
- c. Rated Speed 1755 rpm
- d. Pump Drive Type variable speed
- e. Nominal Motor Horsepower Size 20 HP
- f. Manufacturer & Type
- (i) Pump Flygt NT3153 MT 3~434,
- (ii) Motor Flygt NT3153.095 21-18-4AA-W



## SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT PURCHASE SPECIFICATION

2. Pump Station No. 3 – (three pumps)

a. Service Conditions (gpm @ TDH)

Service Conditions	Q/TDH Minimum	Q/TDH Maximum
1-Pump Operating	986gpm @ 20.0-FT	1159gpm @ 13.1-FT
2-Pump Operating	1722gpm @ 24.3-FT	1923gpm @ 20.8-FT
3-Pump Operating	1993gpm @ 30.5-FT	2333gpm @ 27.1-FT

- b. Minimum Shutoff Head 52.5 feet ± 1 ft
- c. Maximum Synchronous Speed 1720 rpm
- d. Pump Drive Type variable speed
- e. Nominal Motor Horsepower Size 10 HP
- f. Rated Motor Horsepower Size 7.5 HP
- g. Manufacturer & Type
  - (i) Pump Flygt NT3127 LT 3~422,
  - (ii) Motor Flygt NT3127.095 21-12-4AL-W

C. Pump Construction:

1. General

2. Fittings, Valves, and Appurtenances:

a. Pump Station No. 2

- (i) Intake Elbow – two each Flygt 8"x6" long radius elbows, one each 10"x 6" long radius elbow.
- (ii) T Stand Kits – Includes mounting base plate, mounting ring, and fasteners to connect the mounting base plate to the pump. ***Bolts, nuts, and gasket sets to connect the intake elbow to the pump and anchor bolts for pump mounting to the concrete pump base are not included in the pre-purchase scope.***
- (iii) Ball Check Valve – 8-inch Flygt Type 5087 Ball Check Valve, sinking type, 3 each.

b. Pump Station No. 3

- (i) Integral Intake Elbow & Pump Support Base – Flygt 8"x6" with integrated T stand, 3 each. ***Bolts, nuts, and gasket sets to connect the intake elbow to the pump and anchor bolts for floor mounting of pumps are not included in the pre-purchase scope.***
- (ii) Ball Check Valve – 8-inch Flygt Type 5087 Ball Check Valve, sinking type, 3 each.

3. Pump Castings: Castings shall be of cast iron or semi-steel of uniform quality and free from blowholes, porosity, hard spots, shrinkage defects, cracks and other

## SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT PURCHASE SPECIFICATION

injurious defects. The casings shall be designed to permit replacement of wearing parts. Joints shall be properly sealed with O rings and shall not leak under a test pressure equal to 50 percent greater than the pump discharge pressure or the total dynamic head, whichever is greater. Passageways shall permit smooth flow and shall be free from sharp turns and projections.

4. Impellers: Impellers shall be of hard iron (high chrome alloy) suitable for the service required. The impellers shall be smooth and free flowing and shall have sufficient clearance to permit objects in the sewage that enter the pump to pass into the discharge pipe. Each impeller shall be accurately fitted on the shaft, and locked in such a manner that lateral movement will be prevented and reverse rotation will not cause loosening.
5. Balance: All rotating parts of the equipment shall be in such balance, mechanically and hydraulically, as to operate throughout the required range without excessive end thrust, vibration or noise.
6. Shafts: Shafts shall be stainless steel, shall be of sufficient size and strength to perform the work required, and shall be adequately provided with alignment bearings.
7. Bearings: Bearings subject to submersion shall be ball bearings manufactured from high-grade bearing alloy. Bearing shall have a minimum B 10 life of 50,000 hours.
8. Mechanical Seals: Each pump shall be equipped with tungsten carbide seals.
9. Electrical Motors: The pump motor shall be induction type with a squirrel cage rotor, housed in an air filled, watertight chamber, NEMA B type. The stator windings and stator leads shall be insulated with moisture resistant Class H insulation rated for 356 °F. The motor shall have a minimum service factor of 1.15. Power cords shall be non-potted and removable. Stator windings shall be trickle impregnated with resin and rated at 180°C (355°F). Stator windings shall be embedded with three (3) thermal switches for overheating protection. The motor shall have integral moisture sensors that shall be monitored by a motor saver relay. The stator shall be heat-shrink fitted into the housing and locked against rotation. Motor speed, power specifications, and cord length shall be as follows:
  - a. Pump Station No. 2 - Submersible, 1755 rpm, 20 HP, 460 Volt, 3 phase, 60 Hertz. Each pump motor shall be equipped with a 100-ft combined power and signal cord.
  - b. Pump Station No. 3 – Submersible, 1720 rpm, 7.5 HP, 460 Volt, 3 phase, 60 Hertz. Each pump motor shall be equipped with a 50-ft combined power and signal cord.
10. Motor Saver Relay: The pumps shall be pre-wired for connection to Xylem Flygt MiniCAS – 120 motor saver relay. Contractor shall supply Xylem Flygt MiniCAS – 120 to Control Systems Integrator.
11. ***Miscellaneous Metals: Bolts, nuts, anchors, washers, and all other types of supports necessary for the installation of the pumps and drive units shall be furnished and shall be of Type 304 stainless steel. Not included in pre-purchase scope.***

## **SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT PURCHASE SPECIFICATION**

12. Shop Painting: Pump, motor, and accessories shall be factory applied and finish painted in accordance with the manufacturer's standard.
  - D. Pumps must be capable of operating within pump manufacturer's recommended operating envelopes through the full range of design flows and speeds. Any restrictions shall be incorporated into the pump control logic to prevent undesirable operating conditions from occurring at no additional cost to the OWNER.
- 2.03 SPARE PARTS
- A. Each pump station shall be furnished with the following spare parts, plus any additional spare parts listed as recommended by the manufacturer:
    1. Impeller and insert ring for each pump type.

### **PART 3. EXECUTION**

#### **3.01 DELIVERY**

- A. Delivery of all equipment shall be to the Contractor engaged by the City to construct the Pump Station Nos. 2 and 3 improvements. The equipment shall be delivered to a receiving area to be designated by the Contractor. Receipt of the equipment by the contractor shall be done in the presence of representatives from the Contractor, the Owner, the Engineer, and the Supplier. At the time of delivery, all equipment shall be tabulated and inspected. Once it is confirmed that all of the equipment covered by this specification is present and all parties agree that said equipment is undamaged, the Contractor shall take possession of the equipment by executing an record of equipment transfer form. The Contractor shall be responsible for installation and field testing of the pump equipment outlined in this specification section. The Contractor shall supply all labor, equipment, and materials not outlined in this section, but which is necessary to the construction of a complete pumping system at each station.

#### **3.02 INSTALLATION COORDINATION SERVICES**

- A. The supplier shall provide all installation coordination services required during construction.

#### **3.03 START-UP SERVICES**

- A. The pump equipment manufacturer shall furnish the services of a qualified factory trained field service engineer for a minimum of three (3) non-sequential 8-hour days (travel time excluded) to inspect the installations and instruct the Owner's personnel on the operation and maintenance of the pumps. After the pumps have been completely installed and wired, the Contractor shall have the pump manufacturer's field engineer perform the following
  1. Inspect megger stator and power cables.
  2. Check seal lubrication.
  3. Check proper rotation.
  4. Check power supply voltage.
  5. Measure motor operating load and no load current.
  6. Check level control operation sequence.

**SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT  
PURCHASE SPECIFICATION**

7. Perform flow tests to confirm pump's ability to meet the specified design flow conditions.
- B. The Contractor will be required to provide any additional information needed by the pump supplier to validate pump warranties (i.e. voltage and amp readings for each leg of line).

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

**SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT  
PURCHASE SPECIFICATION**

**RECORD OF EQUIPMENT TRANSFER**

**Project:** City of Ferndale  
**City Project No.** SS2014-02  
**Project Name:** Pump Station Nos. 2 & 3 Rebuild

**Transfer From:** Whitney Equipment Company, Inc.  
21222 30th Dr. SE #110  
Bothell, WA 98021

**Transfer To:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Equipment Transferred:** (Attach Bill of Materials, Bill of Lading, etc)

**Pump Station No. 2**

\_\_\_\_\_ each – Flygt NT3153 Wastewater Pumps & Accessories (including)

- Flygt NT3153 MT 3~434 Pump
- Flygt NT3153.095 21-18-4AA-W Motor
- 100-ft Power/Signal Cables
- 6"x8" Intake Elbow (for 2 of the pumps)
- 6"x10" Intake Elbow (for 1 of the pumps)
- T Stand Kits - Mounting Plate, ring, & connectors for pump mounting
- 8" Flygt Type 5087 Ball Check Valve
- Xylem Flygt MiniCAS – 120 motor saver relays and sockets
- Spare Parts per Purchase Order Specification

**Pump Station No. 3**

\_\_\_\_\_ each – Flygt NT3127 Wastewater Pumps & Accessories (including)

- Flygt NT3127 LT 3~422 Pump
- Flygt NT3127.095 21-12-4AL-W Motor
- 50-ft Power/Signal Cables
- 6"x8" Integral Intake Elbow w/ Integrated T Stand
- 8" Flygt Type 5087 Ball Check Valve
- Xylem Flygt MiniCAS – 120 motor saver relays and sockets
- Spare Parts per Purchase Order Specification

**SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT  
PURCHASE SPECIFICATION**

**ACCEPTANCE OF EQUIPMENT:**

The Contractor acknowledges that he has inspected the subject equipment and deemed the equipment to be complete and undamaged. The Contractor hereby agrees that, by signing this record of transfer, the Contractor becomes solely responsible for all costs incurred from this point forward until final acceptance of the project by the City of Ferndale;

- to repair any damage that may occur to said equipment while in the Contractor's care, and
- to replace any of said equipment which may be lost or stolen while in the Contractor's care.

\_\_\_\_\_ hereby accepts the above referenced equipment on this  
\_\_\_\_\_ day of \_\_\_\_\_, 2016.

\_\_\_\_\_  
By:\_\_\_\_\_

Title:\_\_\_\_\_

**WITNESSES:**

\_\_\_\_\_  
By:\_\_\_\_\_

Title:\_\_\_\_\_

\_\_\_\_\_  
By:\_\_\_\_\_

Title:\_\_\_\_\_

## **SECTION 11300 – SUMP PUMP SYSTEM**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Work includes providing and installing one (1) sump pump system in the pump room sump of each of the pump stations as shown on the plans and described herein.

### **PART 2 - MATERIALS**

#### **2.01 SUMP PUMP SYSTEM**

- A. Cast Iron Submersible Sump Pump
  - 1. Manufacturer: MYERS, (or approved equal)
  - 2. Type: MYERS Model #SSM331, 1/3 Hp, 115V, 60 Hz., Amp Draw of 9 Amps, and heavy cast iron construction.
  - 3. Tethered Float and 10-ft cord.
  - 4. Maximum Head = 23-ft; Flow = 28 gpm @ 10-ft lift.
- B. Sump Pump Check Valve
  - 1. Manufacturer: PENTAIR, (or approved equal)
  - 2. Type: PENTAIR Model #CV-150 thermoplastic check valve with reversible connection sleeves for adapting to 1-1/4" or 1-1/2" pipe.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Deliver products in manufacturer's original, unopened cartons. Store in a safe place until ready for installation.
- B. Follow manufacturer's printed instructions for installation.
- C. Remove all packaging labels, marks, etc. from exterior.
- D. Sump pump to be installed in the existing sump in the floor of the Pump Room.
- E. Provide new pump discharge piping in kind to replace existing system.

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





## **SECTION 14600 – HOISTS AND CRANES**

### **PART 1. GENERAL**

#### **1.01 DESCRIPTION**

- A. This work shall consist of supplying and installing the following:
  - 1. A bridge crane system with trolley hoist in the Motor Rooms of each pump station.

#### **1.02 SUBMITTALS**

- A. Submittals shall be made in accordance with SECTION 1300. In addition, the following specific information shall be provided:
  - 1. Descriptive literature and catalog cuts
  - 2. Manufacturer's operation and maintenance manuals and recommended spare part lists.
  - 3. Shop drawings.

#### **1.03 QUALITY ASSURANCE**

- A. Manufacturer shall be of established good reputation and regularly engaged in the fabrication of such equipment.

### **PART 2. PRODUCTS**

#### **2.01 BRIDGE CRANE**

- A. General Description: The bridge crane system includes a trolley beam, trolley beam hangers, a motor driven trolley, 2-speed lug-suspended hoist, pendant controls, and a cable suspension track mounted to the ceiling to support electrical cables. The assembled system shall be rated for lifting 2,000 pound (1-ton) loads.
- B. Painting and Markings: After assembly, all plain steel surfaces (trolley beam and trolley trolley beam hangers, trolley stops, etc...) shall be prepared, primed, and painted in accordance with Section 09900 – Painting. The crane capacity shall be stenciled on both sides of the bridge beam with 4" tall lettering. The lettering shall read "1 TON".
- C. Trolley Beam and Trolley Beam Hangers shall be as detailed on the contract structural plans.
- D. Motor Driven Trolley & Lug-Suspended Hoist Kit: Kit shall include all necessary parts, except trolley beam and trolley beam hangers, to motor driven type, single girder underhung crane bridge with a capacity of 1-ton and span of 19-feet. The kit shall have the following minimum features:
  - 1. Painted with manufacturer's standard finish.
  - 2. Budgit 2-speed Lug-Hoist Model BEH0108, or approved equal.
  - 3. Budgit Motor-Driven Trolley Model MDT01, or approved equal.
  - 4. Capacity = 1 ton
  - 5. Horizontal Trolley Beam Span = 19 feet
  - 6. Standard Vertical Lift = 23-ft

## **SECTION 14600 – HOISTS AND CRANES**

7. Pendant Drop = Coordinate with City Staff,
  8. Power Cord Length = Suitable for full trolley beam travel. Provide cable suspension track to suspend power cord from ceiling.
  9. Metal Chain Container
  10. Load Limiting Device,
  11. Upper and lower limit switches.
- E. Trolley and Runway Beam Stops: Contractor shall provide and install trolley stops on bridge beam and both runway beams as described by bridge crane kit manufacturer's installation instructions and on the plans.

### **PART 3. EXECUTION**

#### **3.01 INSTALLATION**

- A. All equipment described in the section shall be installed in accordance with the manufacturer's recommendations, drawings, and specifications. Alignment and adjustment shall be field verified.

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

## **SECTION 15010 - BASIC MECHANICAL REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. The requirements of this Section apply to all the Work of Division 15.
- B. Provide a complete working installation with all equipment called for in proper operating condition. Documents do not undertake to show or list every item to be provided. When an item not shown or specified is clearly necessary for proper operation of equipment shown or specified, provide an item which will allow the system to function properly at no increase in Contract Sum.

#### **1.02 SUBMITTALS**

- A. General:
  - 1. Submittals shall be in accordance with requirements of Division 1 and as specified.
  - 2. Forward all submittals to the Engineer, together, at one time. Individual or incomplete submittals are not acceptable.
  - 3. Organize submittals in same sequence as they appear in Specification Sections.
  - 4. Identify each submittal item by reference to Specification Section paragraph in which item is specified, or Drawing and Detail number.
  - 5. Identify each item by manufacturer, brand, trade name, number, size, rating, or whatever other data is necessary to properly identify and review materials and equipment. Words "as specified" are not sufficient identification.
- B. Shop Drawings:
  - 1. Show physical arrangement, construction details, finishes, materials used in fabrication, provisions for piping entrance, access requirements for installation and maintenance, physical size, and mechanical characteristics.
  - 2. Catalog cuts and published material may be included to supplement Shop Drawings.
- C. Contract Closeout Submittals:
  - 1. Operation and Maintenance: Subsequent to completion of balancing, and testing operations, instruct Owner's authorized representatives in operation, adjustment, and maintenance of mechanical systems.

#### **1.03 QUALITY ASSURANCE**

- A. Regulatory Requirements:
  - 1. Nothing in the Drawings or Specifications shall be construed to permit Work not conforming to applicable laws, ordinances, rules or regulations.
  - 2. When Drawings or Specifications exceed requirements of applicable laws, ordinances, rules, or regulations, comply with documents establishing the more stringent requirements.

## **SECTION 15010 - BASIC MECHANICAL REQUIREMENTS**

### **1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Ship equipment in its original package to prevent damage or entrance of foreign matter. Perform all handling and shipping in accordance with manufacturer's recommendations. Provide protective coverings during construction.
- B. Identify materials and equipment delivered to the Site to permit check against approved materials list, and reviewed submittals.

### **1.05 PROJECT CONDITIONS**

- A. Equipment Rough-in:
  - 1. Rough-in locations for equipment furnished under other Divisions and for equipment furnished by Owner are approximate only. Obtain exact rough-in locations from the following sources:
    - a. From Shop Drawings for Contractor provided equipment.
    - b. From Architect for Owner furnished, Contractor installed equipment.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. Materials and Equipment General Requirements:
  - 1. All items of materials in each category of equipment shall be of one manufacturer.
  - 2. Groups of items having same or similar function shall be by single manufacturer to facilitate maintenance and service.
  - 3. Compatible with space allocated. Modifications necessary to adjust items to space limitations shall be at Contractor's expense.
  - 4. Conform with conditions shown and specified. Coordinate with other trades for best possible assembly of completed Work.
  - 5. Installed fully operating without objectionable noise or vibration.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Follow manufacturer's directions in all cases where manufacturers of articles used furnish directions covering points not shown or specified.
- B. Accurately set and level equipment with supports neatly placed and properly fastened. No allowance of any kind will be made for negligence on the part of the Contractor to foresee means of bringing in and installing equipment in position inside the building.
- C. Piping Systems:
  - 1. Work into complete integrated arrangement with like elements. Make Work neat and finished appearing.
  - 2. Run concealed, except where shown otherwise. Where exposed run parallel with walls or structural elements with vertical runs plumb, horizontal runs level or uniformly pitched as appropriate.

## **SECTION 15010 - BASIC MECHANICAL REQUIREMENTS**

- 4. Make adequate provisions for expansion and contraction whether those provisions are shown or not.
  - D. Provide hangers, supports, anchors and chases as required for installation of Mechanical Work.
  - E. Excavating and Backfilling: In accordance with requirements of Division 2. Provide all necessary shoring, sheeting, and pumping as part of Work of this Division.
  - F. Concrete: In accordance with requirements of Division 3.
  - G. Interface with other products:
    - 1. Exact routing of piping and other items shall be governed by structural conditions or obstruction. Contractor shall make use of data in Contract Documents. In addition, Architect reserves right, at no increase in Contract Sum, to make any reasonable change in location of mechanical items exposed at ceilings or on partitions to group them in orderly relationships or to increase their utility. Verify requirements in this regard prior to roughing-in.
    - 2. Take dimensions, location of doors, partitions, and similar features from Architectural Drawings. Verify at the Site under this Division. Consult Architectural Drawings for exact location of outlets, and other items to center with architectural features.
- 3.02 FIELD QUALITY CONTROL
- A. Test Mechanical systems in portions as Work progresses.
- 3.03 CLEANING
- A. Properly prepare Work under this Division to be finish painted under Section 09900.
  - B. Thoroughly flush out domestic water piping with domestic water under pressure before faucets, flush valves, and other constantly operated devices are installed.
- 3.04 EQUIPMENT IDENTIFICATION
- A. Properly identify piping, and equipment.

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



## **SECTION 15100 - PIPING**

### **PART 1 - GENERAL**

#### **1.01 SCOPE OF WORK**

- A. This section covers the work necessary to furnish and install the Pump Station piping. Detailed materials and work for each pipe type are specified in the Detail Piping Specifications which are incorporated as part of this section. The pipe system to be used for each process system is shown on the plans.
- B. For trench excavation, backfill, pipe bedding, and material placed in the pipe zone, see Section 02315 TRENCH EXCAVATION AND BACKFILL.
- C. See Division 1 GENERAL, which contains information and requirements that apply to the work specified herein and are mandatory for this project.
- D. The Contractor shall furnish and install pipe and fittings as shown on the Drawings and as specified in these Specifications. The pipe shall be new, manufactured in accordance with these Specifications and Drawings.
- E. Piping systems, including pipe, fittings, anchors, and all other elements, shall be detailed, fabricated, and installed to resist all internal and external loads which will be imposed upon them. Pressure ratings and materials stated in these Piping Specification sections are minimum acceptable standards. Systems shall be suitable for the service intended.
- F. The pipe diameters shown on the Drawings and used in these Specifications are inside diameters unless specific reference is made to outside diameter of the pipe or the pipe is a standardized product normally designated by a nominal size, e.g., ductile iron pipe.

#### **1.02 SUBMITTALS DURING CONSTRUCTION**

Submittals during construction shall be made in accordance with Sections 01300 in Division 1, GENERAL REQUIREMENTS. In addition, the following specific information shall be provided.

##### **A. FIELD FABRICATION**

For pipelines which are assembled in the field from standard fittings, submit complete data on pipe, fittings, linings, coatings, and any manufacturer's installation instructions.

##### **B. FABRICATION AND LAYING DRAWINGS**

For shop fabricated piping, the Contractor shall furnish the Engineer with pipe design calculations, the required test data, and shop drawings which shall include a laying plan and details of pipe sections, special fittings, and bends. Dimensions, coatings, and other pertinent information shall be shown. The laying plan shall show the location of each pipe section and each special length, with each piece numbered or otherwise designated in sequence. All outlets and bends shall be made up into special lengths so that, when installed, they will be located as indicated. Each pipe and fitting shall be marked on the outside to indicate the class of pipe, location number on the laying plan, size or diameter,

## **SECTION 15100 - PIPING**

manufacturer's identification, and date of manufacture. Pipe shall be furnished and installed in accordance with the reviewed laying plan.

### **C. PIPE SUPPORT DRAWINGS**

Drawings of each major piping system locating each support and hanger. Drawings shall identify the support type by catalog number or shop drawing detail number and show anchor locations, identifying them by shop drawing detail number.

### **D. MATERIAL CERTIFICATION**

Certification of all materials, and manufacturing properly executed by the manufacturer, shall be available to show compliance with the Specification of materials being furnished. Test data on tests performed shall be provided as requested by the Engineer.

### **E. FIELD WELDING PROCEDURE**

Details of welding procedures for each type of field weld, including base metal, welding method, electrodes, preheating requirements, and other data.

### **F. PLUMBING CODE**

All sanitary building drainage and vent systems shall conform to the plumbing laws, rules, and regulations of the state and of the city, whichever represents the higher standard. The Owner will obtain any variances imposed by site constraints.

## **PART 2 - PRODUCTS**

### **A. GALVANIZING**

Where galvanizing is specified it shall be hot-dip applied only. Electroplated zinc or cadmium plating is unacceptable.

### **B. PAINTING**

All exposed piping, except copper, stainless steel, and galvanized, shall be painted as specified in Section 09900 PAINTING.

### **C. SLAB, FLOOR, WALL, AND ROOF PENETRATIONS**

All ductile iron penetrations of slabs, floors, walls, and roofs shall be poured in place ductile iron wall pipe. It shall be the Contractor's responsibility to verify the size and location of all building and structure penetrations prior to pouring concrete. All sleeves shall be supported by form work to prevent contact with the reinforcing steel.

### **D. STRUCTURAL CONCRETE WALL PENETRATIONS**

Metal pipe wall penetrations shall use ductile iron Omni-Sleeve with EPDM gaskets. PVC pipe wall penetrations shall use GPK Products sand collars.



## **SECTION 15100 - PIPING**

### **E. PRECAST MANHOLE/VAULTS & WALL PENETRATION SEALS**

Manhole and wall pipe penetrations shall be constructed by coring and sealing with Link-seal modular seals.

### **F. FLEXIBLE COUPLINGS**

Except as noted, flexible couplings for use with steel pipe shall be Dresser, Style 38; Rockwell, Style 411; or equal. Flexible couplings for use with ductile iron pipe shall be Dresser, Style 53 or 153; Rockwell, Style 431; or equal. Depend-o-Lok type ExE, FxF, or FxE couplings as manufactured by Brico Industries may be used as an alternate to flexible couplings on steel, stainless steel, or ductile iron pipe. Bolts and nuts for buried or exposed conditions shall be zinc coated. Bolts and nuts for submerged conditions shall be Type 316 stainless steel. High-strength low-alloy steel in accordance with AWWA C111 may be substituted for zinc-coated nuts and bolts on cast or ductile iron couplings. Thrust ties shall be provided as required or shown, to sustain the force developed by 1-1/2 times the operating pressure specified. Steel middle rings shall be fusion epoxy lined and coated in accordance with Section PAINTING, System No. 29. Ductile iron sleeves with mechanical joints at each end may be substituted for flexible couplings on ductile iron pipe.

### **G. RUBBER GASKET STORAGE**

Store all rubber gaskets in a cool, well-ventilated place, and do not expose to the direct rays of the sun. Do not allow contact with oils, fuels, or petroleum solvents.

### **H. JOINT LUBRICANT**

Furnish joint lubricant with the pipe. Furnish the amount and type recommended by the pipe manufacturer. The lubricant shall be a water-soluble, nontoxic, vegetable soap compound conforming to United States Pharmacopoeia No. P39.

### **I. HYDROSTATIC TESTING**

Provide all hoses, plugs, and other necessary equipment to complete the tests.

## **PART 3 - EXECUTION**

### **A. SHIPPING AND HANDLING MATERIALS**

During transportation, unloading, and storage, pipe and materials shall be protected, supported, and handled in a manner to prevent damage to the materials, especially linings and coatings. Only implements and equipment suitable for proper and safe handling of the materials shall be used. Fabric slings shall be used to lift pipe and fittings, not chains or cables.

### **B. PIPE PREPARATION AND HANDLING**

## **SECTION 15100 - PIPING**

Each pipe and fitting shall be carefully inspected before the exposed pipe or fitting is installed or the buried pipe or fitting is lowered into the trench. The interior and exterior protective coating shall be inspected, and all damaged areas patched in the field with material similar to the original, except damaged glass-lined pipe. Any damaged glass-lined pipe shall not be used and shall be promptly removed from the plant site. Any pipe which, in the opinion of the Engineer, is damaged beyond repair shall be removed from the site and replaced with another unit. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after installation.

Use proper implements, tools, and facilities for the safe and proper protection of the pipe. Carefully handle pipe in such a manner as to avoid any physical damage to the pipe. Do not drop or dump pipe from trucks or into trenches under any circumstances. All pipe fittings and appurtenances shall be installed in accordance with the manufacturer's instructions and these Specifications.

### **C. CUTTING AND FABRICATING**

Cut pipe with approved cutters, do not flame cut except for mild steel pipe. Cut perpendicular to axis of pipe. Dress ends to suit type of joint being made, removing burrs, mill scale, and debris before making up. Repair damaged linings and coatings.

### **D. BELL HOLES**

Excavate bell holes at each joint to permit proper assembly and visual and feeler gauge inspection of the entire joint.

### **E. EXPANSION PROVISIONS**

Provisions shall be made for the expansion and contraction which may occur in pipe due to temperature change. Pipe expansion provisions are not completely detailed on the Drawings. The absence of these details on any Drawing shall not relieve the Contractor of the responsibility for providing them where required, and at his sole expense.

### **F. PIPE IN CONCRETE ENCASEMENTS OR CONCRETE BEDDING**

Except for welded joints, pipe joints shall not be encased in concrete unless specifically required on the Drawings. Pipe coatings shall be continuous through concrete encasements, thrust blocks, anchors, collars, etc., unless otherwise shown on the Drawings.

### **G. FLEXIBLE JOINTS AT CONCRETE BACKFILL OR ENCASEMENT**

Except for welded joint pipe, a flexible joint shall be provided within 18 inches or one-half the pipe diameter, whichever is less, from the terminations of any concrete backfill or concrete encasement.

### **H. FLEXIBLE JOINTS AT CONCRETE STRUCTURES**

## SECTION 15100 - PIPING

Unless shown otherwise on the plans, a flexible joint shall be provided at the face of all manholes or other structures. The joint may be flush with the face, may be up to one half pipe diameter away from the face, but shall not be more than 18 inches away from the face.

A second flexible joint shall be provided within 18 inches of the first joint for pipelines smaller than 18 inches in diameter or within one pipe diameter of the first joint for pipelines larger than 18 inches in diameter.

Flexible joints may be rubber ring joints, mechanical joints, flexible couplings, grooved couplings, or Brico Depend-o-Lok couplings.

### I. LINE AND GRADE

Grade the bottom of the trench by hand, if necessary, to the line and grade to which the pipe is to be laid, with proper allowance for pipe thickness and for base. Remove hard spots that would prevent a uniform thickness of base or uniform pressure on the pipe barrel.

Lay pipe to a uniform grade between indicated elevations. Do not deviate more than 1 inch from line or 1/4 inch from established grade. Measure for grade at the pipe invert.

Before laying each section of pipe, check the grade with as straightedge and correct any irregularities found. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

### J. PERMISSIBLE DEFLECTION AT JOINTS

Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, do not exceed 75 percent of the amount of deflection recommended by the pipe or coupling manufacturer.

### K. LAYING AND JOINTING PIPE AND FITTINGS

After a section of pipe has been lowered into the prepared trench, clean the end of the pipe to be joined, the inside of the joint, and the rubber ring immediately before joining the pipe. Make assembly of the joint in accordance with the recommendations of the manufacturer. Provide all special tools and appliances required for the jointing assembly.

The gasket position shall be checked with a feeler gauge, furnished by the pipe manufacturer, to assure proper seating. After the joint has been made, check pipe for alignment and grade. After sufficient pressure in making the joint to assure that the joint is "home", as defined in the standard installation instructions provided by the pipe manufacturer. To assure proper pipe alignment and joint makeup, place sufficient pipe zone material to secure the pipe from movement before the next joint is installed.

Take the necessary precautions required to prevent excavated or other foreign material from entering the pipe during the laying operation. At all times, when laying operations are not in progress, at the close of the day's work, or whenever the workmen are absent from the job,

## SECTION 15100 - PIPING

close and block the open end of the last laid section of pipe to prevent entry of foreign material or creep of the gasketed joints.

Take all precautions necessary to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.

When cutting and/or machining the pipe is necessary, use only tools and methods recommended by the pipe manufacturer.

### L. UNSUITABLE CONDITIONS FOR LAYING PIPE

Do not lay pipe in water, or when in the opinion of the Engineer, trench conditions are unsuitable.

### M. PREVENTING TRENCH WATER FROM ENTERING PIPE

When the pipe laying is not in progress, close the open ends of pipe by approved means, and do not permit trench water or other foreign material to enter the pipe. Keep water out of the trench.

### N. INSTALLATION OF EXPOSED PIPING

Unless shown otherwise, piping shall be parallel to building lines. Hangers on adjacent piping shall be aligned where possible on common size ranges.

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.

Unions shall be installed where required for piping or equipment installation, even though they are not shown on the Drawings.

Piping shall be installed without springing or forcing the pipe in a manner which would set up stresses in the pipe, valves, or connected equipment.

Required straight runs of piping upstream and downstream of flow measuring devices shall be smooth.

### O. ANCHORAGE AND EXPANSION PROVISIONS

All piping shall be anchored against thrust developed by internal pressures. In addition, provisions shall be made for the expansion and contraction which may occur in pipe due to temperature change. Pipe anchorage and expansion provisions are not completely detailed on the Drawings. The absence of these details on any Drawings shall not relieve the Contractor of the responsibility for providing them where required.

## **SECTION 15100 - PIPING**

### **P. VENTS AND DRAINS**

Vent the high point and drain the low point of all pipelines, whether shown on the Drawings or not, with 3/4-inch gate valves on those pipelines 2-1/2-inch and larger and 1/2-inch gate valves on those pipelines 2-inch and smaller. Valve types shall be selected for the service to be vented and drained.

### **Q. INSTALLATION OF FLEXIBLE COUPLINGS, FLANGED COUPLING ADAPTERS, AND SERVICE SADDLES**

Prior to installation, thoroughly clean oil, scale, rust, and dirt from the pipe to provide a clean seat for the gasket. Care shall be taken that the gaskets are wiped clean before they are installed. If necessary, flexible couplings and flanged coupling adapter gaskets may be lubricated with soapy water or manufacturer's standard lubricant before installation on the pipe ends. Install in accordance with the manufacturer's recommendations. Bolts shall be tightened progressively, drawing up bolts on opposite sides a little at a time until all bolts have a uniform tightness. Workmen tightening bolts shall use torque-limiting wrenches.

Flexible couplings with tie rods may be used to tie pipes against thrust. They shall not be used, with or without tie rods, as expansion joints on pipelines with cyclic temperature changes. Readjust tie rod tension after initial filling before pressure testing. Depend-o-Lok type FxF couplings as manufactured by Brico Industries may be used in lieu of flexible couplings with tie rods.

### **R. CORROSION PROTECTION OF PIPE AND ACCESSORIES**

Not all corrosion protection details are included, either on the Drawings or in the Specifications. The absence of specific details on corrosion and environmental protection measures shall not relieve the Contractor of the responsibility of providing them, all as part of the Contract price.

### **S. CORROSION PROTECTION FOR BURIED PIPE ACCESSORIES**

All buried pipe appurtenances made of steel shall have corrosion protection. Tie rods and similar items shall be heat shrink tube wrapped. Flange bolts, nuts, and similar items shall be coated with a bituminous paint or equal. Flexible couplings, grooved couplings, and similar items shall be heat shrink wrapped or cement coated.

Buried valves and similar elements on wrapped pipelines shall be bituminous paint-coated. On ductile iron or nonmetallic pipelines they shall have exposed nuts and bolts bituminous paint-coated and the entire valve wrapped in 8-mil polyethylene as specified for ductile iron pipe. On cement-coated pipelines they shall be cement-coated similar to detail shown for couplings.

### **T. TESTING**

All of the yard piping and outfall sewer shall be tested in accordance with WSDOT specifications for Air Pressure Test for Sanitary Sewers Constructed of Non Air-Permeable Materials.

**SECTION 15100 - PIPING**

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

## **SECTION 15200 - PIPE, JOINTS, & FITTINGS**

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. This section covers the work necessary to furnish and install water and wastewater lines as shown on the plans and described herein, and in accordance with City of Ferndale development standards.
- B. See Section 15100 PIPING and Section 15300 VALVES, for additional requirements.

### **PART 2 PRODUCTS**

#### **2.01 PRESSURE SEWER PIPE**

- A. Exposed: Ductile Iron: AWWA C115, cement lined, thickness class 53 for flanged or grooved piping systems.
- B. Buried: Ductile Iron thickness class 50; unless flanged or grooved piping systems which are required to be thickness class 53 (as described above), or PVC, AWWA C900/C905, Class 150 (minimum), in accordance with City of Ferndale Development Standards and WSDOT Section 9-30.1. Or as noted on the plans

#### **2.02 POTABLE WATER PIPE**

- A. Water service pipe 2" or less is to be type "K" copper in accordance with City of Ferndale Development Standards and WSDOT Section 9-30.1. All pipe fittings are to be in accordance with City of Ferndale Development Standards and WSDOT Section 9-30.2.

#### **2.03 JOINTS**

- A. Exposed: Flanged joints shall be in accordance with AWWA C115. Grooved and shouldered joints shall be in accordance with AWWA C-606.
- B. Buried: Mechanical or push-on joints to be in accordance with AWWA C111 for ductile iron pipe. Anchoring of mechanical joints with external set screws will not be permitted.

#### **2.04 FITTINGS**

- A. Cast or ductile iron in accordance with AWWA C110 and/or AWWA C153, short body type, 250 psi working pressure. Where taps are shown on fittings, tapping bosses shall be provided.

## SECTION 15200 - PIPE, JOINTS, & FITTINGS

### 2.05 CEMENT LINING

- A. All ductile iron pipe and fittings shall be cement mortar lined and seal coated in accordance with ANSI A21.4/AWWA C104.

### 2.06 COATING

- A. All ductile iron pipe to be buried shall receive a coat of bituminous material. All exposed ductile iron pipe (including all piping in valve vaults) is to be cleaned and shop coated per Section 09900 Painting. All bituminous material on exposed piping is to be sand blasted off, prior to application of epoxy.

### 2.07 POLYETHYLENE ENCASEMENT FOR BURIED DUCTILE IRON PIPE

- A. All ductile iron pipe (potable water pipe and sewer pipe) to be buried shall be protected with tubular polyethylene encasement (Polywrap, or equal).

### 2.08 GROOVED

- A. Grooved couplings shall be Victaulic style 31 for ductile iron pipe, or equal. Couplings for steel or galvanized pipe shall be Victaulic style 07 for rigid systems or Victaulic style 77 for flexible systems. Grooved dimensions shall be per manufacturer's standards.

### 2.09 FLANGES

- A. ANSI A21.15/AWWA C115, threaded, 250 psi working pressure, 125-pound ANSI drilling.

### 2.010 BOLTS

- A. To be ASTM A 307, Grade A hex head bolts and nuts for Class 125 FF Flanges. Required Coatings:

Flanged Fittings Inside Building	316 Stainless Steel Nuts & Bolts
Flanged Fittings Outdoor Exposed	316 Stainless Steel Nuts & Bolts
Flanged Fittings Buried Underground	Manufacturer's Standard
Flanged Fittings in Contact W/ Sewage	316 Stainless Steel Nuts & Bolts
Buried T-Head	Cor-Ten Material

For Mechanical and Grooved Joints      Manufacturer's Standard, or provide bolt & nut material as described above, as a minimum requirement.

Or provide as noted on plans.



## **SECTION 15200 - PIPE, JOINTS, & FITTINGS**

### **2.011 GASKETS**

- A. Gaskets for mechanical or push-on joints shall be rubber conforming to ANSI A21.11, AWWA C111.
- B. All gaskets for ductile iron air piping shall be EPDM (Ethylene Propylene-Diene Monomer) material.
- C. Gaskets for flanged joints in sewage or water service shall be 1/8 inch thick, cloth-inserted rubber conforming to applicable parts of ANSI B16.21 and AWWA C207. Gasket material shall be free from corrosive alkali or acid ingredients. Gaskets shall be one-piece, full-face, with holes to pass bolts. Gaskets for grooved joints shall be Flushseal type, halogenated butyle or nitrile depending on service.

### **2.012 LUBRICANT**

- A. Lubricant for mechanical joint end piping shall be manufacturer's standard.

### **2.013 RESTRAINED JOINT PIPE**

- A. Joints for buried pressure pipe may be "restrained type". However, the use of restrained joints in lieu of thrust blocks will be acceptable only if the pipe configuration, soil conditions, and restrained length are suitable in the opinion of the Engineer.

### **2.014 PIPE SUPPORTS**

- A. Pipe supports as detailed on the Contract Plans.

### **2.015 SERVICE SADDLES**

- A. Ford Iron Service Saddles, Style FC202 with stainless steel bands and epoxy coating, or approved equal.

### **2.016 PRESSURE GAGE FOR PUMP STATION FORCE MAIN**

- A. 2.5" dial in a polypropylene case with a pressure range of 0 to 75 psi, 316 SS bourdon tube & socket, Marsh Marshalltown or equal. Include corrosion resistant diaphragm seal, ITT Conoflow or equal. Provide fittings and adaptors as needed and isolate piping connections, to prevent contact between different types of metals.

## **SECTION 15200 - PIPE, JOINTS, & FITTINGS**

### **PART 3 EXECUTION**

#### **3.01 HANDLING PIPE**

- A. Handle per manufacturer's recommendations. Take care not to damage lining when handling pipe.

#### **3.02 CUTTING PIPE**

- A. Cut pipe with milling type cutter, rolling pipe cutter, or abrasive saw cutter. Do not flame cut. Do not damage linings. Cuts shall leave a smooth end at right angles to the pipe axis.

#### **3.03 DRESSING CUT ENDS**

- A. Dress cut ends of pipe in accordance with the type of joint to be made. Dress cut ends of mechanical joint pipe to remove sharp edges or projections which may damage the rubber gasket.
- B. Dress cut end of push-on joint pipe by beveling, as recommended by the pipe manufacturer.
- C. Dress cut ends of pipe for flexible couplings and flanged coupling adapters as recommended by the coupling or adapter manufacturer.

#### **3.04 FABRICATION OF FLANGED PIPE AND FITTINGS**

- A. Flanged pipe and fittings shall be fabricated in the shop, not in the field, and delivered to the job site with flanges in place and properly faced. Threaded flanges shall be individually fitted and machine tightened on the threaded pipe by the manufacturer. Flanges shall be faced after fabrication in accordance with AWWA C115.

#### **3.05 JOINTING PIPE**

- A. **FLANGED**
  - 1. Prior to connecting flanged pipe, the faces of the flanges shall be thoroughly cleaned of all oil, grease, and foreign material. The rubber gaskets shall be checked for proper fit and thoroughly cleaned. Care shall be taken to assure proper seating of the flange gasket. Bolts shall be tightened so that the pressure on the gasket is uniform. Torque-limiting wrenches shall be used to ensure uniform bearing insofar as possible. If joints leak when the hydrostatic test is applied, the gaskets shall be removed and reset and bolts retightened.

## SECTION 15200 - PIPE, JOINTS, & FITTINGS

### B. MECHANICAL, GROOVED, AND PUSH-ON JOINT

1. Join pipe with mechanical or push-on type joints in accordance with the manufacturer's recommendations. Tools and devices, such as special jacks, chokers,
2. and similar items required for proper installation. Grooved systems may employ Victaulic field grooving tools, including cut and/or roll groovers as needed. Lubricant for the pipe gaskets shall be furnished by the pipe manufacturer, and no substitutes will be permitted under any circumstances.

### 3.06 WATER LINE CONSTRUCTION REQUIREMENTS

- A. Trench excavation, bedding and backfill for water lines shall be installed per WSDOT 7-8 and WSDOT 7-9. All water lines shall be installed per WSDOT 7-9. Valves shall be installed per WSDOT 7-12. Fire hydrants shall be installed per WSDOT 7-14. Service connections shall be installed per WSDOT 7-15. Sanitary sewers shall be installed per WSDOT 7-17.

### 3.07 SPECIAL REQUIREMENTS FOR WATER LINES NEAR SEWER LINES

- A. Construction requirements for water and sewer lines near sewer line either running adjacent to or crossing shall be in accordance with all requirements as specified in Washington State Department of Ecology, *Criteria for Sewage Works Design, C1-9 Special Requirements*.

### 3.08 WATER LINE TESTING AND DISINFECTION

- A. All water mains and appurtenances shall pass a hydrostatic pressure test per WSDOT 7-09.3(23).
- B. All water lines and appurtenances shall be chlorinated and dechlorinated in accordance with WSDOT Section 7-09.3(24) and a satisfactory bacteriological report obtained prior to placing in service.

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



## **SECTION 15300 - VALVES**

### **PART 1 GENERAL**

#### **1.01 SCOPE**

- A. This section covers the work necessary for furnishing and installing the various valves in the pump station piping systems. See Section 15100-PIPING and Section 15200-PIPE, JOINTS, & FITTINGS for additional requirements.

#### **1.02 SUBMITTALS DURING CONSTRUCTION**

- A. Submittals shall be made in accordance with Sections 01300.

### **PART 2 PRODUCTS**

#### **2.01 GENERAL**

- A. All valves shall be complete with all necessary operating handwheels, chain wheels, extension stems, floor stands, worm and gear operators, operating nuts, chains, and wrenches which are required for the proper completion of the work included under this section.

#### **2.02 VALVE OPERATORS**

- A. All valve operators shall open by turning counterclockwise. Buried valve operators shall have AWWA C504 2-inch square operating nuts and be full enclosed, grease packed. All exposed valves shall have handwheel operators on valves within 6 feet of the floor and chainwheel operators on overhead valves. Depending upon valve type, size, and operating torques, gear operators shall be provided as needed so as to permit operation of the valve under full operating head with a maximum pull of 40 pounds on the handwheel. The valve operators shall be of the self-locking type to prevent the disc or plug from creeping. Self-locking worm gears shall be a one-piece design of gear bronze material, accurately machine cut. Handwheels shall be galvanized and painted the same color as the valve and associated pipeline.

#### **2.03 VALVE BOXES**

- A. Valve boxes shall be two-piece screw type, cast iron, with 5-1/4-inch shaft and shall be of appropriate length for the installation. Extension pieces, if required, shall be the manufacturer's standard type. Units shall be Mueller H-10364, Clow Corporation F-2452, or equal. All units shall be complete with all necessary bases and accessories. All buried valves are to be provided with valve box assemblies.

#### **2.04 GATE VALVES**

- A. 4" and larger gate valves are to be U.S. Pipe Metroseal 250, resilient-seated, conform to AWWA C509, transition gaskets where needed, fusion bonded epoxy coated inside and out meeting AWWA C550.

## SECTION 15300 - VALVES

### 2.05 BALL CHECK VALVES

- A. 8-inch Flygt Type 5087 Ball Check Valve, sinking type. **PRE-PURCHASE UNDER SPECIFICATION SECTION 11100.**

### 2.06 KNIFE GATE VALVES

- A. 8" and larger knife gate valves are to be Red Valve Series G, ANSI Class 150, cast iron body lined with stainless steel, 316 metal seat, standard manual handwheel operator or approved equal.

### 2.07 WASTEWATER COMBINATION AIR VALVE

- A. All combination air valves shall be automatic air/vacuum release valves designed for wastewater service. Valves shall have a 2-inch inlet size, a 1.5-inch outlet size, and a working pressure range of 0.2 to 10 bars. Valves shall have a reinforced nylon body and flange inlet. Internal metal parts shall be made of stainless steel SAE316, and the valve shall be equipped with a self-cleaning mechanism and a drainage outlet. Valves shall be A.R.I. Model D-025 Combination Air Valve for Wastewater (Short Version), or approved equal.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Bolt holes of flanged valves shall straddle the vertical centerline of the pipe run. Prior to installing flanged valves, the flange faces shall be thoroughly cleaned. After cleaning, insert gasket and bolts, and tighten the nuts progressively and uniformly. If flanges leak under pressure, loosen or remove the nuts and bolts, reseal or replace the gasket, retighten and/or reinstall the nuts and bolts, and retest the joints. Joints shall be watertight at test pressures before acceptance.
- B. Thoroughly clean threads of screwed joints by wire brushing, swabbing, or other approved methods. Apply approved joint compound to threads prior to making joints. Joints shall be watertight at test pressures before acceptance.

### 3.02 PLACING

- A. Generally, unless otherwise indicated on the Drawings, all valves installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or less above the finish floor shall be installed with their operating stems vertical. Valves installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or greater above the finish floor shall be installed with their operating stems horizontal. If adjacent piping prohibits this, the stems and operating handwheel shall be installed above the valve horizontal centerline as close to horizontal as possible.

### 3.03 TESTING

- A. Valves shall be tested at the same time that the adjacent pipeline is tested. Joints shall show no visible leakage under test. Repair joints that show signs of leakage prior to final

## **SECTION 15300 - VALVES**

acceptance. If there are any special parts of control systems or operators that might be damaged by the pipeline test, they shall be properly protected. The Contractor will be held responsible for any damage caused by the testing.

- B. If requested by the Engineer, the valve manufacturer shall furnish an affidavit stating the materials options furnished and/or that he has complied with these and other referenced specifications.

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





## **SECTION 15400 - PLUMBING**

### **PART 1 - GENERAL**

#### **1.01 SYSTEM DESCRIPTION**

- A. Providing and installing water system and miscellaneous plumbing as described herein and shown on plans.

#### **1.02 SUBMITTALS**

- A. Submittals: Shop Drawings and Product Data.

#### **1.03 QUALITY ASSURANCE**

- A. Regulatory Requirements: Comply with Uniform Building Code (UBC), Uniform Plumbing Code (UPC), and City of Ferndale Development Standards.

### **PART 2 - PRODUCTS**

#### **2.01 REDUCED PRESSURE BACKFLOW PREVENTER (RPBFP) ASSEMBLY**

- A. RPBFP Assembly: FEBCO Series 825Y Reduced Pressure Assembly, or approved equal.
- B. Pressure Reducing Valve: Wilkins Model #1-600XL Pressure Reducing Valve, or approved equal.
- C. Gate Valve: Watts Series LFWGV Lead Free Brass Gate Valve, or approved equal.
- D. Unions: Provide at each pipe connection to equipment and fixtures, and where necessary to disconnect piping for repairs. Match pipe in which installed.
- E. Pipe Supports: Cooper Industries B3090 Support with B3088 Stand, or approved equal.
- F. Enclosure: Aquashield Model BFP2-S Series Aluminum Enclosure, or approved equal.

#### **2.02 AIR GAP WATER SYSTEM**

- A. Storage Tank: Chem-Tainer 100-Gallon Open Top, Flat Bottom Cylindrical Storage Tank, (Part # TC2842AA), or approved equal.
  - 1. One Piece Molded Heavy Walled Tank,
  - 2. 28"D x 42"H, 45 lbs.
  - 3. Resin complies with U.S. Food and Drug Administration regulation 21 CFR 177.1520 © 3.1 and 3.2.
  - 4. Provide Polyethylene (PE) Cover.

## SECTION 15400 - PLUMBING

- B. Jet Pump: Gould ½ HP Model JRS5 Shallow Well Jet Pump, or approved equal. Provide epoxy anchor bolts for floor mounting with 1-in high grouted pad at anchor points.

1. Pump

- a. Maximum Shutoff Pressure – 64 psi,
- b. Maximum Suction Lift – 25-ft.
- c. Discharge Flow of 5.8gpm at 50 psi discharge pressure and 5-ft suction lift.
- d. Impeller – F.D.A. compliant, glass filled Noryl Corrosion and abrasion resistant
- e. 1-1/4" suction and 1" discharge
- f. Pressure switch – AS4 preset (30-50 psi).

2. Motor

- a. NEMA Service Factors,
- b. ½ HP, 115/230V Capacitor Start, 60 Hz.,
- c. Single Phase, 3500 RPMs,
- d. Built-in overload with automatic reset,
- e. Stainless steel shaft,
- f. Rotation – clockwise when viewed from motor end.

- C. Float Valve: Watts Standard Duty Float Valve, 1-in Model #ST1000 with 12.5-in brass stem and 8-in diameter brass ball, or approved equal. Provide 316 stainless steel wall-mounted channel and bracket support to support valve over the storage tank.

- D. Gate Valve: Watts Series LFWGV Lead Free Brass Gate Valve, or approved equal.

- E. Check Valve: Smit-Cooper International CV30L Series Brass Check Valve, or approved equal.

- G. Unions: Provide at each pipe connection to equipment and fixtures, and where necessary to disconnect piping for repairs. Match pipe in which installed.

- H. Tank Supports – Provide 316 SSL, turnbuckles & connectors, and ¼" 316 SSL cable supports around tank at two points along its height.

- I. Water Piping, Joints, Fittings, & Supports per Sections 15100 & 15200 and the Contract Plans.

## **SECTION 15400 - PLUMBING**

### **PART 3 – EXECUTION**

#### **3.01 INSTALLATION**

- A. Bury outside water piping minimum four feet below finished grade.
- B. Slope drainage lines 1/4 inch per foot or as required to meet code.
- C. Provide sealant at all exposed vertical and horizontal joints between fixtures and wall to provide a smooth and watertight transition from fixture to wall.
- D. Mount fixtures at standard heights above finished floor or as shown.
- E. Provide accessible cleanouts as required by code.
- F. Install in accordance with Manufacturer's instructions and as per local codes and ordinances

#### **3.02 FIELD QUALITY CONTROL**

- A. Water Piping: Test by hydrostatic pressure at least 1-1/2 times maximum operating pressure, but not less than 100 psi, for a minimum of 24 hours. Use only potable water for testing.
- B. Waste and Vent Piping: Fill with water to highest point in each system with all air removed.

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



## **SECTION 15800 – ROOF EXHAUST FAN & LOUVERED VENTS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Work includes providing and installing the following (as noted herein and shown on the drawings):
- Station Roof (each station) – two fiberglass centrifugal exhaust blowers with VFD control.
  - Station Motor Room – one fixed blade louver with insulated blank-off panel and one counterweighted back draft damper.

### **PART 2 - MATERIALS**

#### **2.01 ROOF EXHAUST BLOWERS**

- A. Fiberglass Centrifugal Exhaust Blower
1. Manufacturer: Hartzell Fan, Inc.
  2. Distributor: Coast Products, Inc., (800) 735-7026
  3. Type: Series A87-4-151FE100STFCH3 fiberglass centrifugal exhaust fan, 15-in diameter, full width, 2900 CFM at 0.25" static pressure, 1hp, 1750 rpm motor, or approved equal. Hand control of fan control via a VFD controller mounted in the Motor Room. Reference the electrical plans and specifications for additional information.
  4. Operation: Hand control of fan control via a VFD controller mounted in the Motor Room. Reference the electrical plans and specifications for additional information.

#### **2.02 LOUVERED VENTS**

- A. Fixed Blade Louver
1. Manufacturer: Pottoroff
  2. Distributor: Coast Products, Inc., (800) 735-7026
  3. Type: Model EDD-445 dual-drainable blade louver, 4-inch deep x 0.08-inch thick channel, high performance fluoropolymer (100% resin Newlar / 70% resin Kynar) coating, insect screens, welded construction, or approved equal. Provide 2-in thick, insulated blank-off panel with a 24-in by 24-in opening cut into it as detailed on the plans.
- B. Counterweighted Back Draft Damper

## **SECTION 15800 – ROOF EXHAUST FAN & LOUVERED VENTS**

1. Manufacturer: Tamco
2. Distributor: Coast Products, Inc., (800) 735-7026
3. Type: Series 7000 CW extruded aluminum counterweighted back draft damper (or approved equal), 24-in by 24-in by 2.5-in thick, mount to the fixed louver blank-off panel over the 24-in by 24-in opening.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Deliver blowers and vents in manufacturer's original, unopened cartons. Store in a safe place until ready for installation.
- B. Follow manufacturer's printed instructions for installation.
- C. Remove all identifying marks, labels, etc. from exterior.
- D. Install all controls for exhaust fans in accordance with the electrical plans and specifications.

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

## **SECTION 15821 – ELECTRIC UNIT HEATERS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Work includes providing and installing one (1) electric unit heater and wall mounted thermostat in the motor room of each of the pump stations as shown on the plans and described herein. All heaters are to be mounted to the wall as discussed below.

### **PART 2 - MATERIALS**

#### **2.01 ELECTRIC UNIT HEATERS**

- A. Electric Unit Heaters
  - 1. Manufacturer: TRANE, (or approved equal)
  - 2. Type: TRANE Model #UHRA-033DA, 3kW, 580 CFM airflow, 10,236 Btu/hr, 480V/3ph, 24V control transformer, contactor for 24V control circuits, individually adjustable outlet louvers, and cast aluminum control box. Motor = ¼ hp.
  - 3. Mounting Bracket: TRANE Horizontal wall/ceiling swivel bracket.
  - 4. Wall-Mounted Room Thermostats: Remote wall mounted thermostat (factory supplied) 40 to 90 degree F operating range.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Deliver products in manufacturer's original, unopened cartons. Store in a safe place until ready for installation.
- B. Follow manufacturer's printed instructions for installation.
- C. Remove all packaging labels, marks, etc. from exterior.
- D. Heater unit to be mounted to the wall at an elevation of 7' above floor elevation.
- E. Thermostat to be located 4' above floor elevation.

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





## **CERTIFICATION PAGE**

I hereby certify that these contract documents were prepared by me or under my direct supervision and that I am a duly licensed engineer under the laws of the State of Washington.



6/8/2016

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## SECTION 16010 – GENERAL ELECTRICAL

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. The General Conditions, Supplementary Conditions, and related work in other Sections apply for all work in Section 16.

#### 1.2 SCOPE OF WORK

- A. This section specifies general requirements for electrical work. Detailed requirements for specific electrical items are specified in other sections, but are subject to the general requirements of this section. The electrical drawings and schedules included in this project manual are functional in nature and do not specify exact locations of equipment or equipment terminations. It is the intent of this Section of the Specifications and the accompanying drawings to describe and provide for the furnishing, installing, testing and placing in satisfactory and fully operational condition all equipment, materials, devices and necessary appurtenances to provide a complete electrical system, together with such other miscellaneous installations and equipment hereinafter specified and/ or shown on the drawings. The work shall include all materials, appliances and apparatus not specifically mentioned herein or shown on the drawings, but which are necessary to make a complete, fully operational installation of all electrical systems shown on the drawings or described herein. Equipment and devices furnished and installed under other Sections of this specification shall be connected under this Section. The drawings and specifications are complementary and what is called for in either is binding as if called for in both.
- B. This project may include installation of packaged equipment system(s) or sub-system(s) that will require coordination between the Contractor and the manufacturer to determine the detailed installation requirements. The Engineer has shown general installation information for these systems based on the best information available at the time of design. Where indicated on the drawings to *'provide a complete and operational system'* the Contractor shall provide all materials, installation, and coordination with the manufacturer so the equipment is installed and operates in a satisfactory manner. Minor changes in equipment locations, quantity of terminations or wires, junction boxes, conduit, etc shall be included in the Contract price.
- C. See all other Sections of these specifications for work in other areas and disciplines related to this project.

#### 1.3 GENERAL DESCRIPTION OF ELECTRICAL WORK

- A. The Contractor shall provide all labor, material, tools, equipment and services required to complete the furnishing, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical equipment, devices and

## SECTION 16010 – GENERAL ELECTRICAL

components as indicated and implied by the drawings and specifications.

B. General descriptions include:

1. Complete the procurement, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical devices, components, accessories and equipment that is not shown or specified but which is nonetheless required to make the systems shown and specified function properly.
2. Install all equipment so it shall be readily accessible for maintenance. Installations shall have electrical clearances in accordance with NEC and shall be installed in locations that will provide adequate cooling.
3. Check electrical equipment prior to installation so that defective equipment is not installed.
4. Provide field services of qualified technicians to supervise and check out the installation of the equipment, to supervise and check out interconnecting wiring, to conduct start-up of operation of the equipment, and to correct any problems that occur during start-up.
5. Provide circuit breakers, conduit, wire and installation for all items that require electrical power.

### 1.4 PROJECT DESCRIPTION

- A. This project shall consist of all electrical and controls construction required to completely upgrade the existing City of Ferndale Pump Stations No.2 and No.3.
- B. The following is a general description of the work anticipated by the Electrical Contractor at each location:
1. Electrical demolition of all existing electrical equipment.
  2. Coordination with Puget Sound Energy for electrical service modifications to upgrade the service size and metering to current standards.
  3. Provide service entrance and metering equipment.
  4. Provide on site standby generator and automatic transfer switch.
  5. Provide motor control panels and/or Motor Control Center including VFDs and full voltage bypass starters, as shown on the drawings.
  6. Provide power distribution and panels for 480V distribution, dry transformer and lighting and receptacle panelboard.
  7. Provide new lighting and controls.
  8. Provide disconnects where shown or as required to meet Code.
  9. Modify existing Telemetry Panel for additional I/O and communication requirements, and new operator interface.

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10. Provide new instrumentation.
11. Provide backup float control panel.
12. Provide programming and commissioning services from the Citys programmer, L2 Systems.
13. Provide startup, testing, documentation, commissioning and training for all new systems.
14. Pump Station No.2 Notes:
  - a. The electrical panels are located above the 100 year flood level as indicated on the drawings. All panels shall be sized and located above this level and shall be sized and installed to meet Code.
  - b. Provide and re-connect feeder to existing storm water pump station #8.

### 1.5 ELECTRICAL CONTRACTOR MINIMUM QUALIFICATIONS

- A. The Electrical Contractor shall have a minimum 5 years of experience with having performed similar construction installation. Provide a summary of qualifications with the bid form, including Owner, project description, and summary of electrical equipment manufacturer and ratings.

### 1.6 CODES AND REGULATIONS

- A. The electrical systems shall be installed based on the following current Standards:
  1. NFPA 70 - National Electrical Code - current version as adopted by Washington State Department of L&I.
  2. Washington Administrative Code (WAC) chapter 296-46B.
  3. Building Codes - International Conference of Building Officials as adopted and amended by the Local Jurisdiction.
  4. All local City Codes.
- B. The Contractor is required to familiarize himself with the detailed requirements of these standards and any local codes and ordinances as they affect the installation of specific electrical systems.
- C. All materials shall be new, free from defect, current manufacture and quality.
- D. Identification of Listed Products
  1. All materials and equipment specified herein shall be within the scope of Nationally Recognized Testing Laboratory (NRTL) examination services, be approved by the NRTL for the purpose for which they are used, and shall bear the appropriate listing label.

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2. Equipment listed/labeled by an NRTL shall be as dictated by the latest printing of the Electrical Testing Laboratories Accreditation Report available from the State of Washington Department of Labor and Industries, Electrical Inspection Division. Any NRTL listing/labeling shall be as accepted by the local authority having jurisdiction.
3. When a product is not available with a testing laboratory listing for the purpose for which it is to serve, the product may be required by the inspection authority to undergo a special inspection at the manufacturer's place of assembly. All costs and expenses incurred for such inspections shall be included in the original contract price.
4. Where field modifications require field inspection for listing/labeling, the Contractor shall be responsible for all field inspection fees for listing/labeling of all final modified electrical assemblies.

### E. Thermal ratings of equipment terminations

1. All materials shall conform to the National Electrical Code Article 110-14C. Wiring and circuit breakers on this project are designed for 75 deg C operation above 100 amperes; 60 deg C for 100 amperes and below.
2. All products furnished on this project shall have electrical terminations rated for 60 deg C for ampacities of 100 amperes and below, and rated for 75 deg C for ampacities above 100 amperes.

## 1.7 PERMITS AND FEES

- A. The Contractor shall obtain and pay for all licenses, permits and inspections required by laws, ordinances and rules governing work specified herein. The Contractor shall arrange for inspection of work by the inspectors and shall give the inspectors all necessary assistance in their work of inspection.

## 1.8 POWER DURING CONSTRUCTION

- A. The Contractor shall provide a separately metered temporary power service for use during construction. Provide power for operation of all equipment until project is complete. Provide all coordination and pay all utility fees associated with temporary power.
- B. Pump Station No.2 Notes:
  1. The electrical service at pump station #2 provides power for the 100 amp, 480V, three phase feeder to storm water pump station #8.
  2. In addition to providing temporary power to pump station #2, the contractor shall provide temporary power to pump station #8 during construction.

## 1.9 COORDINATION

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## SECTION 16010 – GENERAL ELECTRICAL

- A. The Contractor responsible for accomplishing Section 16 work shall coordinate his work with that of the other Contractors and/ or other trades doing work on the project and shall examine all drawings and specifications of other trades for construction details and necessary coordination.
- B. Obtain submittals and shop drawings of all equipment with electrical connections furnished under other Sections of the specifications. Provide all wiring in accordance with requirements indicated. Advise the Engineer of any changes which may affect the contract price.
- C. Special attention is called to the following items and all conflicts shall be coordinated prior to installation:
  - 1. Location of pipes and equipment so that all electrical equipment, lighting fixtures and other electrical outlets and equipment are clear from and in proper relation to these items.
  - 2. Recessing and concealing electrical materials in CMU walls, concrete construction and similar construction methods.
  - 3. Electrical characteristics (HP, KVA, voltage, phase) of actual equipment furnished under other Sections being different from that shown on the electrical drawings.
- D. The Contractor will not be paid for relocation of work, cuttings, patching and finishing required for work requiring reinstallation due to lack of coordination prior to installation.

### 1.10 SITE FAMILIARIZATION

- A. The Contractor shall become familiar with all features of the site which may affect the execution of the work prior to submitting a bid. The Contractor shall take all field measurements necessary for the work and shall assume full responsibility for their accuracy. The Contractor shall take full responsibility for locating and avoiding all substructures and utilities. Any damage to existing equipment or utilities shall be repaired or replaced by the Contractor at the Contractors expense.

### 1.11 AREA CLASSIFICATIONS

- A. The following classification of areas shall be used as a reference in determining application of material covered by this Section unless specifically shown otherwise on the drawings.
  - 1. Outdoor, Damp or Corrosive Areas:
    - a. Raceways shall be Rigid Galvanized Steel (RGS). Conduit entrances shall be threaded and fittings shall have gasketed covers. Threaded fastening hardware and rods shall be galvanized or

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stainless steel. Raceway supports such as channel, clamps, and brackets shall be galvanized steel, stainless steel or aluminum. Panels and boxes shall be NEMA 4X, 3R or as shown on the drawings. Enclosures shall be mounted 1 inch from walls to provide an air space unless specifically shown otherwise. Device boxes shall be cast, copper free aluminum.

2. Below Grade Areas:
  - a. Conduits shall be Schedule 40 PVC, or as indicated on the drawings. Sweeps shall be RGS. Transitions from below to above-grade areas in damp areas shall be PVC coated RGS.
3. Hazardous areas: All areas indicated as Hazardous Areas on drawings, or as classified by NFPA 820.
  - a. Raceways, junction boxes and sealing fittings shall be installed in accordance with NFPA 70, article 500.
4. General Purpose Areas: All other areas not described above
  - a. Raceways shall be RGS. Raceways concealed in walls or ceilings for general purpose lighting and receptacle circuits may be EMT. Exposed boxes shall be NEMA 12. Concealed boxes may be NEMA 1.

### 1.12 CONTRACT DRAWINGS

- A. Raceways, boxes, and ground connections are shown diagrammatically only and indicate the general character and approximate location. The drawings do not necessarily show the total number of raceways or boxes for the circuits required, nor are the locations of indicated runs intended to show the actual routing of the raceways. The Contractor shall furnish, install and place in satisfactory condition all raceways, boxes, conductors, and connections and all other materials required for the electrical systems shown or noted in the contract documents to be complete, fully operational and fully tested upon completion of the project.
- B. The drawings do not show all requirements of the specifications. The drawings and specifications are complimentary and what is called for (or shown) in either is required to be provided as if called for in both.
- C. The horsepower of motors and apparatus wattages shown on the drawings are estimated requirements of equipment furnished under other Sections of this contract and bid shall be based on these sizes. Overload elements shall be provided to suit actual equipment nameplate current. Advise Engineer of any equipment changes or substitutions affecting electrical systems.
- D. Any minor changes in the location of the raceways, outlets, boxes, devices, wiring, Utility equipment, etc., from those shown on the drawings shall be made without extra charge, where directed before rough-in.



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- E. When inserts or sleeves for outlet boxes, conductor, cables and/ or raceways are required, Contractor shall provide and shall fully coordinate the installation with other trades.
- F. Electrical drawings shall be used for construction of electrical systems only. The electrical drawings do not show construction features of other trades.

### 1.13 ELECTRICAL SUBMITTALS

- A. Electrical submittals shall be submitted electronically via .pdf document, labeled with the project and Contractor's name. An index shall be provided showing each product being submitted. Submittals shall be separated by section per the electrical specifications by section and paragraph or equipment. Each equipment submittal sheet shall clearly indicate the individual equipment name and part number. Submittals shall include:
  - 1. Manufacturer's name, address, and telephone number
  - 2. Trade name, catalog model or number, nameplate data and size clearly indicated
  - 3. Layout dimensions, capacity, project specification and paragraph reference
  - 4. Local manufacturers representative
- B. Submittals shall be largely complete prior to the first submittal. Long lead items may be submitted separately. Each item shall be clearly marked and provided with adequate sales and technical information to clearly show conformance with all aspects of the specification. Packages not provided as described above or largely incomplete shall be returned to the Contractor, without review or comment.
- C. The Contractor shall ensure that the material being proposed conforms to the Contract requirements. In the event of any variance, the Contractor shall state specifically which portions vary and shall request a variance in writing. The Contractor shall certify that all furnished equipment can be installed in the spaces allocated.
- D. The Contractor shall provide shop drawings on 11" x 17" paper, and shall be scaled using standard engineering or architectural scales. Wiring diagrams shall identify circuit terminals, and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment.
- E. Failure to submit a specified item does not relieve the Contractor from meeting the requirements of the Specification.
- F. The Engineer will review the original submittal and one re-submittal on each item. Subsequent submittal reviews shall be conducted at the Contractor's

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expense. The Contractor shall be billed at the Engineer's current hourly rates for these subsequent submittal reviews.

### 1.14 EXISTING SYSTEMS

- A. Prior to bidding, the existing site, exiting site electrical systems and systems adjacent to the work shall be investigated thoroughly. Any damage resulting from performance of work under this contract shall be repaired to assure continuing operation and integrity during and at completion of the project a no increase in contract cost. Any existing wiring serving devices to remain in service and which is interrupted by work performed under this contract shall be rerouted to maintain circuit continuity. Contractor shall assume responsibility for unscheduled interruptions and expedient repair. The Contractor shall inspect the existing systems prior to bidding and shall make his own judgment as to the work required to provide a complete installation within the intent of the contract documents.

### 1.15 DEMOLITION WORK

- A. All demolition work required under this contract is not shown on the drawings.
- B. The Contractor shall inspect the existing sites and installations prior to bidding and shall make his own judgment as to the work required to provide complete demolition as shown or within the intent of the contract documents.
- C. Existing equipment, systems, and materials removed during demolition shall be made available for his inspection and decision as to whether the Owner will retain possession. Items selected for retention shall be turned over to the Owner. These items shall be delivered to a location on the premises selected by the Owner.
- D. All material not selected for retention by the Owner and debris shall be legally disposed of by the Contractor.

### 1.16 RECORD DRAWINGS

- A. The Contractor shall record the actual electrical system installation on a set of prints kept readily available at the project during construction. These prints shall be used for this purpose alone. Accurately locate with exact dimensions all underground and under slab raceways and stub-outs. At the completion of the work, Contractor shall furnish the Engineer a set of record drawings and the set of markups. Final payment to the Contractor will not be authorized until these prints have been submitted to and accepted by the Engineer. The contractor shall maintain one set of record drawings at the job showing any deviations in the electrical systems from the original design.
- B. Markings shown on the drawings shall conform to the following color coding conventions:

- 1. Red - Additions or changes showing placement different than shown on

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the original drawings

2. Green - Deletions or modifications depicting placements different than shown on the original drawing
3. Blue - Notes and Dimensional data showing exact placement of concealed or buried equipment, raceways, etc.

### **1.17 WARRANTY**

- A. The Contractor shall guarantee all work installed under this specification. He shall repair or replace, at his own expense, defective work, materials or parts which are identified within one year after final acceptance.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. All materials must be new, free from defects and not less than the quality herein specified.
- B. Each type of materials furnished shall be of the same make and shall be of the standard products or manufacturers regularly engaged in the production of such materials and shall be the manufacturer's latest standard design.
- C. All materials and equipment installed shall have been tested and listed by Underwriters Laboratories or other approved testing organization and shall be so labeled unless otherwise permitted by the Code Inspector (AHJ).

### **2.2 NAMEPLATES**

- A. Nameplates shall be provided on all electrical devices. This includes motor control equipment, MCC buckets, control stations, junction boxes, panels, motors, instruments, switches, indicating lights, meters, and all electrical equipment enclosures.
- B. Nameplates shall be made of 1/16" thick machine engraved laminated phenolic having engraved black filled letters not less than 3/16" high on white background.
- C. Warning nameplates shall be provided on all panels and equipment which contain multiple power sources or which may have energized circuits with the main disconnecting means in the off position. Lettering shall be white on red background.
- D. All nameplates shall be secured to equipment with stainless steel screws or fasteners. Epoxy glue may be used where fasteners are not practical as determined by the Engineer.

### **2.3 OPERATION AND MAINTENANCE (O&M) MANUALS**

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- A. The Contractor shall prepare O&M manuals for all equipment furnished under Section 16 of the specifications.
  - B. The information included must be the exact equipment installed. Where sheets show the equipment installed and other equipment, the installed equipment shall be neatly and clearly identified on such sheets.
  - C. The O&M manuals shall contain all the information needed to operate and maintain all systems and equipment provided in the project. It shall be presented and arranged in the logical manner for efficient use by the Owner's operation personnel. The information provided shall include but not be limited to the following:
    - 1. Equipment manufacturer, make, model number, size, etc.
    - 2. Equipment nameplate data.
    - 3. Description of system configuration and operation including component identification.
    - 4. Dimensional and performance data for specific unit provided.
    - 5. Manufacturer's recommended operation instructions.
    - 6. Manufacturer's recommended lubrication and servicing data.
    - 7. Complete parts list including reordering information and recommended spares. Parts lists shall give full ordering information assigned by the original parts manufacturer.
    - 8. Shop drawings and wiring diagrams.
    - 9. Provide electronic .pdf copies of all O&M documentation and panel drawings.
  - D. Wiring diagrams for each system shall be complete drawings for the specific system installed under the contract.
  - E. The information contained in the manuals shall be grouped in an orderly arrangement by specification index. The manuals shall be bound in a hard cover binder and tabbed with an index. O&M manuals shall not exceed 5" thick. Provide two or more volumes if required. The covers shall be imprinted with the name of the job, Owner, Engineer, Electrical Engineer, Contractor and year of completion. Hard covers and literature contained may be held together with screw post bindings.
  - F. A preliminary copy, complete, except for the bound cover, shall be submitted 30 days prior to completion of the project for checking and review. The quantity of manuals shall be as indicated in the General Conditions, but shall not be less than (3) complete sets.
  - G. In addition to the hard-copy O&M documents, provide a final .pdf copy of the
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complete O&M manual.

### **2.4 HOUSEKEEPING PADS**

- A. Provide a concrete housekeeping pad under each floor mounted motor control center and other floor mounted electrical equipment. Pad shall be 3” wider on both ends than base of equipment mounted on it. Minimum height is 3”.

## **PART 3 - EXECUTION**

### **3.1 STORAGE AND HOUSEKEEPING**

- A. The Contractor shall store all electrical equipment in a dry environment free from dust, moisture, sprays or vapors which may be detrimental to their new condition. After installation of equipment, the Contractor shall take care to protect all equipment from all dust, moisture, paint and other sprays, and harmful vapors.
- B. The premises shall be kept free of accumulated materials, rubbish and debris at all times. Surplus material, tools and equipment must not be stored at the job site. Upon completion of the project, all equipment and fixtures shall be cleaned and in proper condition for their intended use.

### **3.2 SCHEDULING WORK WITH UTILITIES**

- A. The Contractor shall be fully and completely responsible for all scheduling and coordination with the Utility companies, including the electrical utility provider, and telephone company, as applicable. The Contractor shall coordinate and schedule power outages, power service for operation and construction, telephone and power service as required by the facility prior to Certificate of Occupancy. All coordination with the Utility and associated construction costs for temporary construction power shall be paid for by the Contractor. The Contractor shall pay for the energy costs as billed by the utility on the construction power meter.

### **3.3 CONTRACTOR/UTILITY INTERFACE RESPONSIBILITIES**

- A. Contractor shall clarify all questions regarding utility installation prior to bid. The Contractor shall comply with all Utility company standards and requirements. The serving Utility for this project is Puget Sound Energy, and the contact is Joe Noble, 360-715-7224.
- B. The separation of responsibility for installation tasks shall be coordinated with the Utility at the time of construction.
- C. Utility fees from Puget Sound Energy for the electrical service modifications will be paid by the City.
- D. The Contractor shall provide the following service and material, as indicated on the drawings:

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1. Provide secondary underground service raceway modifications from the existing pole to new service location.
  2. Pump Station No.2: Provide new CT enclosure with landing pads and meter base to meet PSE requirements.
  3. Pump Station No.3: Provide new meter base including disconnecting means ahead of meter base, to meet PSE requirements.
  4. Provide new circuit breaker service disconnect.
  5. Provide all wire and conduit downstream of meter base or CT enclosure.
  6. Coordinate with PSE for wiring and connections for upgraded secondary.
  7. Provide new grounding system.
  8. Coordinate utility and local agency inspections.
- E. The Utility will provide the following service and material:
1. Secondary conductors from pole mount transformer to meter base or CT enclosure.
  2. Install CTs and electric meter in Contractor-furnished CT enclosure and meter base.
- F. Service equipment shall be listed and labeled by UL as "Suitable for Use as Service Equipment".

### 3.4 TESTS

- A. The Contractor shall conduct testing for installed feeder cables, motors, and other electrical equipment.
- B. Functional testing of all electrical systems shall be performed. Prior to functional testing, all protective devices shall be adjusted and made operative. Prior to energizing the equipment, the Contractor shall perform a functional checkout of each individual control circuit. Checkout shall consist of energizing each control circuit and operating each control device and verifying that the specified action occurs. The Contractor shall submit a description of the proposed functional test procedures prior to the performance of the functional checkout.

### 3.5 TRAINING

- A. After substantial completion of the work, O&M manuals have been delivered to the owner, all testing is complete and final inspection of the work by the Authority(s) Having Jurisdiction, the Contractor shall demonstrate the electrical systems and instruct the Owner's designated operation and maintenance personnel in the operations and maintenance of the various electrical systems. The Contractor shall arrange scheduled instruction periods with the Owner. The Contractor's representatives shall be knowledgeable in each system and suppliers

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representatives, when so specified.

B. Scheduled minimum instruction period at each location shall be:

- |    |                      |         |
|----|----------------------|---------|
| 1. | Electrical Systems   | 2 Hours |
| 2. | Pump Control Systems | 4 Hours |

### 3.6 FINAL ACCEPTANCE

A. Prior to final acceptance, the Engineer will perform one or more site observation trips to develop a punch list of items deemed incomplete. The Electrical Contractor shall be present while these inspections are taking place and shall be available for opening cabinets and operating and adjusting the system as is necessary for the Engineer to verify all equipment is installed and operates to the requirements of the contract documents.

B. The Contractor shall complete all items of work, including wire markers, nameplates, final tests and final test reports prior to requesting final acceptance inspections. All equipment shall be checked for proper operation and all signals verified for correct calibration and wiring. Fixtures shall have been cleaned, and burned out or defective lamps shall have been replaced.

### 3.7 STANDARD ABBREVIATIONS

Abbreviation	Definition
Accepted	Reviewed with no exceptions taken to submittal material.
AHJ	Authority Having Jurisdiction
ANSI	American National Standards Institute
Approved	Inspected and accepted by the Authority Having Jurisdiction
ASTM	American Society for Testing Materials
Boxes	Outlet, Junction or Pull Boxes
Code	All codes currently enforced at project location
Compression	Compressed using a leverage powered crimping tool
Connection	All materials and labor required for equipment to be fully operational
CSI	Construction Specifications Institute
EMT	Electrical Metallic Tubing
Exterior	Outside of outer surfaces of the location building
Fully Operational	Tested and approved and operating to the satisfaction of the AHJ, manufacturer and contract documents
Furnish	Purchase and deliver material
Install	Install and make fully operational
kcmil	Thousand circular mils (also MCM)
Mfr	Manufacturer
NEC	National Electric Code NFPA #70 current revision as adopted by AHJ

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NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
Noted	Shown or specified in the contract documents
PVC	Polyvinyl Chloride
Provide	Furnish and install
RGS, GRS	Rigid Galvanized Steel
Required	As required by code, AHJ, or contract documents for the installation to be fully operational
Shop Drawing	Hand drafted document which fully details the equipment and intended installation relative to this specified project
Shown	As indicated on the drawings or details
Submittal	Material for Engineer review which may include catalog cuts, shop drawings, wiring diagrams, etc., of the actual material being furnished.
UL	Underwriters Laboratories, Inc.
Wiring	Raceway, conductors and connections

END OF SECTION 16010



## **SECTION 16110 - RACEWAYS**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

- A. This section specifies raceways for electrical conductors including fittings and supports. Raceways shall be provided for power, control, instrumentation, grounding, lighting, receptacles, and signaling systems. Raceways consist of conduits, tubing, and tray systems. For the purpose of this specification, conduit and tubing is described collectively as conduit.

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

- A. Material

- 1. All materials shall be new, free from defects, of current manufacture, of quality specified or shown. Each type of material shall be of the same manufacturer throughout the work.

- B. Unscheduled Raceway

- 1. With the exception of lighting, communication, paging, security and receptacle circuits, the type and size of raceway shall be as specified on the drawings or schedules. Lighting and receptacle raceway are unscheduled and shall be sized by the contractor in accordance with the NEC. Minimum size shall be 1/2 inch for exposed and 1 inch for embedded raceway.

- C. Scheduled Raceway

- 1. The size and type of raceway shall be as specified on the drawings or schedules. In case of conflicts between the drawings and paragraph 3.1, the drawings shall prevail.

#### **2.2 RACEWAY**

- A. Application – also see Area Classifications Section 16010.1.10.

- 1. All conduits shall be Galvanized Rigid Steel (GRS), unless otherwise noted.
  - 2. All connections to vibrating equipment or motors shall be liquidtight flexible metallic conduit.
  - 3. PVC installed above grade shall be UV resistant Schedule 80.
  - 4. Underground power, control and telephone conduits shall be schedule 40

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PVC. (All sweeps and risers for transition from below grade to above grade shall be PVC coated, GRS), unless indicated otherwise.

5. Underground conduits serving non-critical loads such as site lighting, signs, etc. shall be PVC schedule 40.
6. Indoor lighting and receptacle circuits may be EMT. Conduit shall be concealed where possible.

### B. Rigid Steel Conduit (RGS)

1. Rigid conduit shall be steel, hot dipped galvanized. Final conduit terminations shall be by means of threaded hubs or double locknuts and insulating grounding type bushings.

### C. Liquid Tight Flexible Metallic Conduit

1. Flexible conduit shall be interlocking single strip, hot dipped galvanized and shall have a polyvinyl chloride jacket extruded over the outside to form a flexible watertight raceway.

### D. Nonmetallic Conduit

1. Nonmetallic conduit shall be rigid PVC, Schedule 40 or 80. Fittings shall be of the same material as the raceway and installed with solvent cement per the manufacturer's instructions. Conduit, fittings and solvent cement shall all be manufactured by the same manufacturer.

### E. PVC Coated Rigid Steel Conduit

1. Conduit shall be hot dip galvanized, then coated with urethane inside and outside, then covered with 40 mil PVC coating.

### F. Aluminum Conduit

1. Aluminum conduit shall be rigid ANSI C80.5, threaded.

### G. Electrical Metallic Tubing (EMT)

1. EMT shall be UL 797 and ANSI C80.3, steel tubing, hot-dip galvanized. EMT fittings shall be ANSI/NEMA FB 1, steel, raintight, insulated throat, compression type.

## 2.3 FITTINGS AND BOXES

### A. Material

1. Materials for fittings and boxes shall be chosen to satisfy the requirements of Paragraph 16010. 1.10 - Area Classification. All screws, nuts, bolts, and other hardware used with fittings and boxes shall be stainless steel

## SECTION 16110 - RACEWAYS

unless installed in general purpose areas.

### B. Unions

1. All unions of the type designated as UNF and UNY and shall be suitable for use in moist atmospheres. Unions shall be of cast ferrous alloy, electroplated with zinc.

### C. Locknuts

1. All locknuts used in general purpose areas shall be extra heavy steel electroplated with zinc for sizes  $\frac{3}{4}$  inch to 2 inches. Locknuts larger than 2 inches shall be of malleable iron, electroplated with zinc. Locknuts used in damp and outdoor areas shall be stainless steel. Locknuts in corrosive areas shall be FRP.

### D. Bushings

1. All bushings shall be steel or malleable iron threaded type electroplated with zinc or hot-dip galvanized. Bushings shall have a molded-phenolic or nylon insulating collar.
  - a. Grounding Bushings: Grounding-type bushings shall have a projecting portion drilled for the size grounding cable used and shall be provided with a clamp or set screw for securing the cable. In addition, a set screw shall be provided to securely lock the bushing to the conduit. Grounding bushings shall be GEDNEY Type IBC-L-BC, or T&B No. 3870 through 3880, or T&B BG Series, or equal.
  - b. Bushed Openings: Bushings for protection of cables passing through metal boxes or troughs shall all be phenolic type and shall be OZ Type ABB, or equal.
  - c. Hubs for connection of conduit to boxes shall be of zinc. Hubs for use in damp or corrosive areas shall be non metallic or aluminum to match the raceway. The hubs shall provide a liquidtight connection to the box and an insulating bushing for the wiring. Hubs shall be Thomas and Betts bullet type, or equal.

### E. Liquidtight Flexible Metallic Conduit Connectors:

1. Connectors for liquidtight flexible metallic conduit shall be electroplated zinc malleable iron. An O-ring gasket and an approved grounding insert shall be part of the unit. Where applicable, 45 degree and 90 degree fittings may be used. Liquid-tight connectors shall be by O.Z. GEDNEY, or equal.

### F. Expansion Fittings

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1. Expansion fittings in exposed runs shall be weatherproof type and shall be provided with an external bonding jumper. The expansion fittings shall allow for 4 inch longitudinal movement and shall be designed so that when completely assembled the end of each conduit entering the fitting is bushed. Fittings shall be O.Z. GEDNEY Type EX, or equal.
2. Deflection fittings in embedded runs shall be of the watertight type and shall be provided with an internal bonding jumper. The expansion material shall be neoprene and shall allow for  $\frac{3}{4}$  inch movement in any direction. Fittings shall be O.Z. GEDNEY Type DX, or equal.

### G. Junction Boxes

1. Junction boxes, device boxes, fixture support boxes, oblong, round and rectangular conduit fittings (condulets) shall be of the same material as required by the area classification for the raceway. Junction boxes for use in general purpose areas shall be zinc electroplated cast ferrous alloy. Integrally cast threaded hubs or bosses shall be provided for all conduit entrances and shall provide for full 5 thread contact on tightening. Drilling and threading shall be complete before finishing. Boxes shall be Crouse-Hinds type FS, FD, or approved equal.
2. Cover plates shall be of similar cast ferrous alloy material and finish. Full body neoprene gaskets shall be provided with all covers and shall fastened with stainless steel screws.
3. NEMA 12 boxes shall be of heavy gauge sheet steel, or cast metal. All NEMA 12 boxes shall be provided with a 5 mil thick light gray thermo-epoxy finish, and designed so that moisture will drain away from the gasketed cover joint. Covers for sheet steel boxes shall have turned edges, ground smooth to form a tight seal against the gasket when the cover is closed.

## 2.4 CONDUIT & CABLE SUPPORTS

### A. Conduit Supports

1. Hot-dip galvanized framing channel shall be used to support groups of conduit. Individual conduit supports shall be one-hole galvanized malleable iron pipe straps used with galvanized clamp backs and nesting backs where required. Conduit supports for PVC or epoxy coated rigid steel and PVC conduit systems shall be one hole PVC or epoxy coated clamps or PVC conduit wall hangers.

### B. Ceiling Hangers

1. Ceiling hangers shall be adjustable galvanized carbon steel rod hangers as specified. Straps or hangers of plumber's perforated tape are not acceptable. Unless otherwise specified, hanger rods shall be 1/2-inch all-

## **SECTION 16110 - RACEWAYS**

thread rod and shall meet ASTM A193. Hanger rods in corrosive areas and those exposed to weather or moisture shall be stainless steel.

### **C. Racks**

1. Racks shall be constructed from framing channel. Interior channels and hanger rods shall be steel, hot dip galvanized, 1.5 oz. / sq. ft. after fabrication. Field cuts shall be re-galvanized by the Galv-A-Weld process or equal. Channels attached directly to building surfaces shall be 14 gauge minimum thickness, 1-5/8 inch deep.
2. Framing channels on all exterior areas and in corrosive areas shall be stainless steel. All hardware shall be stainless steel. Framing channel shall be as manufactured by Unistrut or equal.

### **2.5 CONDUIT SCHEDULE**

- A. Refer to conduit schedule on the drawings for raceway sizing and routing description.

### **2.6 CONDUIT TAGS**

- A. Conduit tags shall be corrosion resistant and remain legible after exposure to abrasion or aggressive fluids. Tags shall be crosslinked polyolefin construction. Manufacturer shall be Impact Industries, or equal.

### **2.7 HAND HOLES**

- A. Hand holes shall be precast concrete with checker plate, galvanized, traffic covers designed for H-20 loading. Dimensions shall be as specified on the drawings. Hand holes shall be provided with precast solid concrete slab bottoms with sumps, with drains, or as shown on the drawings. Hand holes shall be construction of 3000 psi reinforced concrete.

### **2.8 UNDERGROUND MARKING TAPE (DETECTABLE TYPE)**

- A. Underground marking tape shall be for location and early warning protection of buried power and communication lines. Tape shall be detectable by a pipe / cable locator or metal detector from above the undisturbed ground. Tape shall be nominally 2 inches wide with a type B721 aluminum foil core laminated between two layers of 5 mil thickness polyester plastic. The plastic color shall be red for electrical lines and orange for telephone lines. A warning shall be imprinted continuously along the length, with message reading similar to: "CAUTION - STOP DIGGING - BURIED ELECTRIC (TELEPHONE) LINE BELOW." Tape shall be Brady "Detectable Identoline"; Services and Materials "Buried Underground Tape, Detectable", or equal.

## **PART 3 - EXECUTION**

## SECTION 16110 - RACEWAYS

### 3.1 CONDUIT

#### A. General

1. The Contractor shall limit the number of directional changes of the conduit to a total not more than 270 degrees in any run between pull boxes. Conduit runs shall be limited to 400 feet, less 100 feet or fraction thereof, for every 90 degrees of change in direction. Bends and offsets shall be avoided where possible but, where necessary, shall be made without flattening or kinking, or shall be factory preformed bends. Turns shall be made with case metal fittings or conduit bends. Welding, brazing or otherwise heating of conduit is not acceptable.
2. Where required for pulling cable and as necessary to meet the requirements of the previous Paragraph, the Contractor shall provide cast junction or pull boxes.
3. Conduit entering NEMA 1 type sheet steel boxes or cabinets shall be secured by locknuts on both the interior and exterior of the box or cabinet and shall have an insulating grounding or bonding bushing constructed over the conduit end. Conduit entering all other boxes shall be terminated with a threaded hub. Cast boxes and nonmetallic enclosures shall have threaded hubs. Joints shall be made with standard couplings or threaded unions. Metal parts of nonmetallic boxes and plastic coated boxes shall be bonded to the conduit system. Running threads shall not be used in lieu of conduit nipples, nor shall excessive thread be used on any conduit. The ends of conduit shall be cut square, reamed and threaded with straight threads.
4. Unless otherwise specified, conduit entering field equipment enclosures shall enter the bottom or side of the box. Where conduit comes from above, it shall be run down beside the enclosure and a tee conduit and drip leg shall be installed.
5. When new conduit is added to areas which are already painted, the conduit and its supports shall be painted to match the existing facilities. Where new conduit is used to replace existing conduit, the existing conduit and supports shall be removed, resulting blemishes shall be patched and repainted to match original conditions.

#### B. Conduit Support

1. Exposed conduit shall be run on supports spaced not more than 10 feet apart and shall be constructed with runs parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceiling.
2. Where three or more conduits are located in a parallel run, they shall be spaced from the wall using framing channel. Support systems shall be galvanized steel unless otherwise specified.

## SECTION 16110 - RACEWAYS

3. Conduit rack and tray supports shall be secured to concrete walls and ceilings by means of cast-in-place anchors. Individual conduit supports shall use cast-in-place anchors, die-cast, rust-proof alloy or expansion shields. Wooden plugs or plastic inserts are not acceptable as a base to secure conduit supports.

### C. Conduit Penetrations

1. Unless otherwise specified, conduit routed perpendicular through floors, walls or other concrete structures shall pass through cast-in-place openings wherever possible. In cases where cast-in-place openings are not possible, appropriate size holes shall be bored through the concrete to accommodate the conduit passage. The size and location of the holes shall not impair the structure's integrity. After completion, grout or caulk around conduit and finish to match existing surroundings. Unless otherwise protected, conduits that rise vertically through the floor shall be protected by a 3 1/2-inch high concrete pad with a sloping top.
2. Conduits entering manholes and handholes shall be horizontal. Conduits shall not enter through the concrete bottom of handholes and manholes.
3. Wherever conduits penetrate outdoor concrete walls or ceilings below grade, the Contractor shall provide a watertight seal as manufactured by O.Z. Gedney Co., Type CSM Series; Thunderline Corp., Link Seal; or equal.
4. Wherever conduits enter buildings or structures below grade, seal the conduit opening (after installation of conductors and cables), with conduit sealing material, to prevent water from entering the structure, enclosure, etc. Sealing compound to be a pliable, removable putty-type compound listed for the application.

### D. Conduit Separation

1. Signal conduits shall be separated from AC power or control conduits. The separation shall be a minimum of 12 inches.

### E. Conduit Seals for Hazardous or Corrosive Areas

1. Each conduit passing from a hazardous or corrosive area into a non-hazardous or non-corrosive area shall be provided with a sealing fitting which may be located on either side of the boundary. The seal shall be located at the boundary in accordance with NEC article 500.
2. Seal fittings for conduit systems in hazardous atmosphere locations shall be hot-dip galvanized case ferrous alloy. Sealing compound shall be hard type, Chico A, or equal, UL listed for explosion-proof sealing fittings. Sealing compound shall be non-hardening type for corrosive areas. Provide reducing bushings and larger seals as required to meet NEC 25% fill.

## **SECTION 16110 - RACEWAYS**

### **3.2 HAND HOLES**

- A. Hand holes shall be set plumb and the tops shall be at finished grade level, or as shown on the drawings.
- B. Drainage systems shall be installed to prevent the buildup of standing water inside the hand hole. Provide a drain pipe to the nearest sump or drain. Where not available, provide drain rock under the hand hole to meet Civil specifications.

**END OF SECTION 16110**



## **SECTION 16120 – WIRE AND CABLE**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

- A. This section specifies conductors and cables rated to 600 volts used for power, lighting, receptacle, signal, and control circuits.

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

- A. With the exception of lighting, communication, paging, security and receptacle circuits, the type, size and number of conductors shall be as specified on the drawings or schedules. Lighting and receptacle circuit conductors are unscheduled and shall be sized by the Contractor in accordance with the NEC to limit voltage drop to 3 percent. Number and types of communication, paging, and security cables shall be as required for the particular equipment provided.

#### **2.2 LIGHTING AND RECEPTACLE BRANCH CIRCUIT CONDUCTORS**

- A. Lighting and receptacle conductors shall be stranded except for 12 AWG which shall be solid. Minimum conductor size shall be 12 AWG.
- B. Conductors shall be provided with the following characteristics:
  - 1. Voltage: 600 volts
  - 2. Conductor: Bare soft annealed copper, Class B stranded per ASTM-8; solid per ASTM B-3
  - 3. Insulation: THWN/THHN, 90 degree C dry, 75 degree C wet polyvinylchloride (PVC)
  - 4. Jacket: Nylon
  - 5. Flame resistance: UL 83
  - 6. Manufacturer: Okonite; Southwire; or equal
  - 7.

#### **2.3 POWER AND CONTROL CONDUCTORS AND CABLE, 600 VOLT**

- A. Single Conductor:
  - 1. Single conductor cable shall be stranded and shall be used in conduits for power and control circuits.
  - 2. Conductor shall be provided with the following characteristics:

## SECTION 16120 – WIRE AND CABLE

- a. Voltage 600 volts
- b. Conductor: Uncoated, soft annealed copper, Class B stranded per ASTM B-8
- c. Insulation: Power: XHHW-2, 90 degrees C cont. rating, wet or dry.
- d. Control: THWN/THHN, 90 degree C dry, 75 degree C wet Flame resistance: UL 83
- e. Manufacturer: Okonite, Southwire; Anaconda; or equal

### 2.4 CONNECTORS

- A. Pre-insulated Connectors for splices and taps in conductors 10 AWG and smaller shall be Ideal Industries "Wing Nut" or 3M Company "SCOTCHLOCK", or equal. For 8 AWG and larger conductors shall be T&B compression connectors, or equal. Compress using manufacturers recommended die and tools.
- B. Waterproof silicone filled "wing nut" type connectors or spade/lug type terminations and terminals and coat with liquid insulation shall be used for all connections of wire to cord to removable equipment provided with integral cords (such as floats, transmitters, limit switches, etc.) in junction boxes in underground hand holes or outdoor junction boxes. Insulators shall be Thomas and Betts multi splice insulator MSLT112-4, or equal.

### 2.5 SPLICE INSULATION

- A. Splice insulation shall be equal or greater than the insulation level of the conductor used.
- B. All permanent splices that are underground or in damp or corrosive environments shall be insulated with cast epoxy type insulation which covers the jacket of all cords and the insulation on all wire. Epoxy splice shall be Scotch #3570 or equal.

### 2.6 WIRING SCHEDULE

- A. Refer to cable schedule for description of conductors required.

### 2.7 MOTOR TERMINAL SPLICE INSULATION

- A. Motor terminal splice insulation in the motor connection box shall be provided which will withstand constant vibration and abrasion without degrading the insulation of the splice. A product shall be used that is specifically designed for the purpose of motor terminations in accordance with the following:
  - 1. Motor splices in general purpose areas: bolted splice with a TY-RAP boot type insulator, Thomas and Betts Splice insulator Series MSC, or equal. Splices using wire larger than 8 AWG may be heat shrinkable motor

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connection stub splices, Raychem, MCK-V series, or equal.

2. Motors in outdoor, damp, or corrosive environments: waterproof motor stub insulator, Thomas and Betts multi splice insulator MSLT112-4, or equal. Splices using wire larger than 8 AWG may be heat shrinkable motor connection stub splices, Raychem, MCK-V series, or equal.

### 2.8 WIRE MARKERS

- A. Field installed wire markers shall be T&B SMS pre-printed clip-on markers, or equal.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Each power and control conductor shall be identified at each terminal to which it is connected.
- B. Pulling wire and cable into conduit or trays shall be completed without damaging or putting undue stress on the cable insulation. Soapstone, talc or UL listed pulling compounds are acceptable lubricants for pulling wire and cable. Grease is not acceptable. Raceway construction shall be complete, cleaned, and protected from the weather before cable is placed in the raceway.

### 3.2 600 VOLT CONDUCTOR AND CABLE

- A. Conductors in panels and electrical equipment, 6 AWG and smaller, shall be bundled and laced at intervals not greater than 6 inches, spread into trees and connected to their respective terminals. Lacing shall be made up with plastic cable ties. Lacing is not necessary in plastic panel wiring duct. Conductors crossing hinges shall be bundled into groups not exceeding 12 and shall be so arranged that they will be protected from chafing when the hinged member is moved.
- B. Slack shall be provided in junction and pull boxes and hand holes. Slack shall be sufficient to allow cables or conductors to be routed along the walls of the box. Amount of slack shall be equal to largest dimension of the box. Where plastic panel wiring duct is provided for wire runs, lacing is not required.
- C. Solid wire shall not be lugged, nor shall electrical spring connectors be used on any except for solid wires in lighting and receptacle circuits. Lugs and connectors shall be installed with a compression tool.
- D. All splices and terminations are subject to inspection by the Engineer prior to and after insulating. Terminations at 460-volt motors shall be made by bolt-connecting the lugged connectors. Connections shall be insulated and sealed with factory-engineered kits. Bolt connection area shall be kept free of mastics and

## SECTION 16120 – WIRE AND CABLE

fillers to facilitate rapid stripping and re-entry. Motor connection kits shall accommodate a range of cable sizes for both in-line and stub-type configurations. Connection kits shall be independent of cable manufacturer's tolerances.

- E. In-line splices and tees, where approved, shall be made with tubular compression connectors and insulated as specified for motor terminations, except that conductors 10 AWG and smaller may be spliced using self-insulating connectors. Splices and tees in underground handholes or pull boxes shall be insulated using Scotch-cast epoxy resin splicing kits. Terminations at devices with 120 volt pigtail leads shall be made using self-insulating tubular compression connectors.
- F. Terminations at solenoid valves, 120 volt motors, and other devices furnished with pigtail leads shall be made using self insulating tubular compression connectors.
- G. In the case where multiple field located instrumentation and control devices require parallel or series wiring configuration, it shall be done at one location in one junction box with terminals. Interconnection of instrumentation and control devices shall not be done within conduit bodies (i.e. LBs, condulets, etc.)
- H. Provide shielded power cable for leads extending from VFDs to motors, where indicated.

### 3.3 SIGNAL CABLING

- A. Circuit runs shall be of individually shielded twisted pairs or triads. In no case shall a circuit be made up using conductors from different pairs or triads. Triads shall be used wherever 3-wire circuits are required. Terminal blocks shall be provided at instrument cable junctions unless otherwise specified. Signal circuits shall be run without splices between instruments, terminal boxes, or panels.
- B. Shields shall not be used as a signal path, except for coaxial cable circuits operating at radio frequencies.
- C. Unless otherwise specified, shields shall be bonded to the signal ground bus at the control panel and isolated from ground and other shields at other locations. Terminals shall be provided for running signal leads and shield drain wires through junction boxes.
- D. Spare circuits shall be terminated on terminal blocks at both ends of the cable run and be electrically continuous through terminal boxes. Shield drain wires for spare circuits shall not be grounded at either end of the cable run. Terminal boxes shall be provided at instrument cable splices. If cable is buried or in raceway below grade at splice, an instrument stand shall be provided as specified with terminal box mounted approximately 3 feet above grade.
- E. Cable for paging, telephone, and security systems shall be installed and

## SECTION 16120 – WIRE AND CABLE

terminated in compliance with the manufacturer's recommendations.

### 3.4 COLOR CODING

- A. Wiring shall conform to the following color code, unless otherwise specified.
- B. Insulation on phase conductor sizes 8 AWG and smaller shall be colored, 6 AWG and larger may have black insulation with plastic tape of the appropriate color from the table below.
- C. Insulation on the grounded conductor (neutral) sizes 6 AWG and smaller shall be colored; 4 AWG and larger may have black insulation with plastic tape of white or gray in accordance with the table below.

Description	208Y/120V	480Y/277V	Control
Phase A (Left, Top, Front)	Black	Brown	--
Phase B (Center, Center, Center)	Red	Orange	--
Phase C (Right, bottom, Back)	Blue	Yellow	--
Neutral	White	Gray	White
Ground	Green	Green	Green
120 VAC Control	--	--	Red
120 VAC Control	Neutral	--	White
DC Control (+)	--	--	Blue
DC Control (-)	--	--	Blue w/white stripe
External Source	--	--	Yellow

- D. All control wiring in control panels or other enclosures that is powered from an external source and is not disconnected by the control panel disconnect shall be terminated at a disconnecting terminal block upon entering the enclosure. The color of the wire shall then be changed to yellow to identify it as being powered from an external source. Provide identification nameplate on exterior of enclosure to indicate sources of external power.

### 3.5 TERMINAL MARKING

- A. All terminals in instrument and relay compartments, motor control centers, in control panels, instrument panels, field panels and control stations, as well as connections to mechanical equipment shall have reference number and letter.

### 3.6 WIRE BENDING RADIUS

## SECTION 16120 – WIRE AND CABLE

- A. The radius of bends in all non-shielded wire (conductors and cables) shall not be less than eight (8) times the outside diameter of the wire. Shielded or lead covered wire shall not be bent to a radius less than twelve (12) times the diameter of the wire. Any wire installed with bends less than the allowed diameter and which the Engineer deems has caused that insulation to be damaged, shall be removed and new wire shall be installed.

### 3.7 GENERAL TESTS

- A. The Contractor shall perform voltage, current and resistance tests as required in this section. Test reports shall be submitted to the Engineer prior to final acceptance by the Owner. The Contractor shall inform the Engineer of scheduled testing a minimum of 5 days prior to the testing.
- B. The Contractor shall undertake all such corrective measures if the test results indicate corrective measures are required. No additional compensation will be paid for corrective measures
- C. Test Scope
  - 1. The Contractor shall provide all material, equipment, labor and technical supervision to perform tests and inspections as specified herein.
  - 2. It is the intent of these tests to assure that all electrical equipment as supplied and installed by the Contractor is operational within the industry and manufacturer's tolerances and is installed in accordance with the design documents.
  - 3. The tests and inspection shall determine the suitability for energization.
- D. Conductor Tests
  - 1. Following the completion of installation, the following conductors shall be tested:
    - a. All power feeders scheduled in Conduit and Cable Schedule.
    - b. Service conductors and feeder conductors
    - c. All new grounding; measure ground resistance at each ground rod.
- E. Visual and Mechanical Inspections
  - 1. Inspect exposed section for physical damage.
  - 2. Verify cable is supplied and connected in accordance with specifications and one line diagram, and that phases are labeled correctly.
- F. Electrical Tests
  - 1. Perform insulation resistance test on each cable in reference to ground and

## **SECTION 16120 – WIRE AND CABLE**

adjacent conductors in the same raceway.

2. Perform continuity test to ensure proper cable connection.

### **G. Test Values**

1. Insulation resistance tests shall be performed at 1000 volts DC for one-half minute.
2. Minimum megger readings at 20 degrees C shall be one megohm.
3. The maximum acceptable reading for an individual ground rod shall be 25 ohms as required by the NEC and measured by the three rod method. The composite ground electrode shall have a maximum acceptable reading of 15 ohms.

END OF SECTION 16120





## SECTION 16140 – WIRING DEVICES

### PART 1 GENERAL

#### 1.01 DESCRIPTION

- A. This section covers furnishing and installing all receptacles, switches and other wiring devices indicated on the drawings.

#### 1.02 PRODUCTS

- A. General

- 1. Wiring devices shall be UL approved for the current and voltage specified and shall comply with NEMA WD-1. Devices shall contain provisions for back wiring and side wiring with captively held binding screws. Devices shall be brown except those located in finished areas, which shall be ivory.

- B. Receptacles and Plugs

- 1. General:
    - a. Receptacles shall be grounding type.
  - 2. 120 Volt Receptacles:
    - a. Indoor Clean Areas: Receptacles shall be duplex 20 ampere, NEMA 5-20R, and shall accept NEMA 5-15P and 5-20P plug caps. Receptacles shall be Hubbell 5362 or equal.
    - b. Ground Fault Circuit Interrupter (GFCI) receptacles: GFCI receptacles shall be provided in all areas as required by local codes and NEC article 210.8 Hubbell GF-5362, or equal.
    - c. Outdoor, Process or Corrosive Areas: Receptacle shall be duplex, 20 ampere, NEMA 5-20R, and shall accept NEMA 5-15P and 5-20P plug caps. Receptacle and plug caps shall be corrosion resistant. Covers shall be rated for “while-in-use” and installed per manufacturer’s directions. Manufacturer shall be Hubbell Series WP, or approved equal.

- C. Switches

- 1. General Purpose (Indoor, Clean Areas):
    - a. General purpose switches shall be quiet AC type, specification grade, and shall be provided in accordance with rated capacities as required. Switches shall match receptacles in color. Switches shall be manufactured by General Electric, Hubbell, or equal.
  - 2. Switches for Outdoor and Corrosive Areas

## SECTION 16140 – WIRING DEVICES

- a. Switches shall be 20 amp with weatherproof/corrosion resistant neoprene plate as manufactured by Hubbell, Arrow-Hart, or equal.
  - b. Switches shall be mounted in “FS” type copper-free aluminum or PVC mounting boxes.
- D. Device Plates
- 1. Device plates shall be provided with switches. In noncorrosive indoor areas, receptacle device plates shall be made of sheet steel, zinc electroplated with chrome finish. Device plates in corrosive or outdoor areas shall be corrosion-resistant type. Device plates for explosion-proof equipment shall be factory provided with the equipment.
  - 2. Device plates shall be provided with engraved laminated phenolic nameplates with 1/8 inch white characters on black background. Nameplates for switches shall identify panel and circuit number and area served. Nameplates for receptacles shall identify circuit and voltage if other than 120 volts, single phase.

## PART 2 EXECUTION

### 2.01 GENERAL

- A. Boxes shall be independently supported by galvanized brackets, expansion bolts, toggle bolts, or machine or wood screws as appropriate. Wooden plugs inserted in masonry or concrete shall not be used as a base to secure boxes, nor shall welding or brazing be used to attachment. Wiring devices shall be tested for correct connections.
- B. Position of Outlets
  - 1. All outlets shall be centered with regard to building lines, furring and trim, symmetrically arranged in the room. Set outlets shall be set plumb and extend flush outlets to the finished surface of the wall, ceiling or floor without projecting beyond same. All receptacles, switches and outlets shown on the drawings shall be installed symmetrically along trim and where necessary, set the long dimension of the plate horizontal or gang in tandem.
- C. Mounting Heights
  - 1. Unless otherwise noted, wall mounted outlet devices shall generally be 24 inches above the floor, 18 inches in architecturally treated areas. Switches shall be 48 inches above the floor. All measurements are to centerline of device.

## **SECTION 16140 – WIRING DEVICES**

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



## **SECTION 16170 – DISCONNECTS AND SWITCHES**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

- A. This section specifies disconnects required by code for equipment furnished under this and other Divisions of these specifications.

#### **1.2 STANDARDS AND CODES**

- A. All equipment, materials, and the design, construction, installation, and application thereof shall comply with all applicable provisions of the national electrical code (NEC), the occupational safety and health act (OSHA), and any applicable federal, state, and local ordinances, rules and regulations. All materials and equipment specified herein shall be within the scope of nationally recognized testing laboratory (NRTL) examination services, be approved by the NRTL for the purpose for which they are used, and shall bear the appropriate listing label.

#### **1.3 SUBMITTALS**

- A. Submit all catalog data In accordance with the Submittals requirements in Section 16010.1.12. Show material information and confirm compliance with these Specifications.

### **PART 2 - PRODUCTS**

#### **2.1 DISCONNECTS**

- A. Disconnect switches shall be heavy duty type, shall be horsepower rated, quick-make, quick-break construction. Switch blades shall open all ungrounded conductors and shall be single throw, unless otherwise noted.
- B. Disconnect switch enclosures shall be suitable for location in which mounted in accordance with Section 16010.1.10.
- C. Disconnects shall be circuit breaker type. Fusible disconnects shall only be utilized where required by equipment manufacturer to meet UL installation requirements.

#### **2.2 MANUFACTURER**

- A. Disconnect switches shall be manufactured by Cutler Hammer, Square D, Westinghouse, or equal.

## SECTION 16170 – DISCONNECTS AND SWITCHES

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Switches shall be mounted at locations shown on plans. Installation shall be in accordance with the following methods:
1. Mounting
    - a. Disconnects shall be fastened securely to supporting structure at walls and stands:
    - b. Wood screws or lag screws to wood boards or timbers
    - c. Machine bolt to metal framing or plates
    - d. Expansion anchors to concrete walls
    - e. Expansion toggle wing bolts or sleeve anchors to hollow block
    - f. Provide 1 inch spacers to set enclosure out from concrete or block wall
  2. Stands and Supports
    - a. Disconnect stands and support shall be constructed of and secured by:
    - b. Corrosion-resistant materials and finishes
    - c. Unistrut-type materials for fabrication
    - d. Expansion anchors for bolts in concrete floor
    - e. Machine bolt to metal framing or plates
    - f. Wood screws or lag screws to wood boards or timber
    - g. Backing plate for mounting units.
    - h. Fasten stand securely to floor
    - i. Dimensions as required by equipment to be mounted
  3. Arrangement
    - a. Disconnects shall be arranged for driven equipment use or function:
    - b. Similar units adjacent
    - c. Adequate space for operation and servicing
  4. Mounting Height
    - a. Center of handle shall be 4 feet 6 inch above the finished floor or work platform.

#### 3.2 IDENTIFICATION

## **SECTION 16170 – DISCONNECTS AND SWITCHES**

- A. Nameplates shall be provided for all disconnects in accordance with Section 16010.2.2.
- B. Nameplate to state load designation and power source equipment.

END OF SECTION 16170





## **SECTION 16200 – STANDBY GENERATOR**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

This section specifies standby natural gas/LPG spark ignited generator set, including engine-driven generator with controls, fuel system, output circuit breaker and all required auxiliary systems.

##### **A. General**

1. The generator set shall be a complete, factory-assembled power generating system including engine, radiator-type engine cooling system, engine exhaust system, engine fuel system, engine speed control system, engine starting system, generator, generator regulator system, control panel, main circuit breaker, structural steel support frame assembly, fuel tanks and accessories, automatic transfer switch and all other components and ancillary devices required for a complete, operable system.
2. The generator set shall be designed by the manufacturer and all components of the generator set shall be selected by the manufacturer to:
  - a. Be an integrated electrical generating system with compatible components and all required controls and appurtenances.
  - b. Continuously produce the kVA demanded by the load described on the drawings and in these specifications for any duration of interruption of the normal utility source.

##### **B. Regulatory Requirements**

1. All materials and equipment specified herein shall be within the scope of Nationally Recognized Testing Laboratory (NRTL) examination services, be approved by the NRTL for the purpose for which they are used, and shall bear the appropriate listing label.
2. Equipment listed/labeled by an NRTL shall be as dictated by the latest printing of the Electrical Testing Laboratories Accreditation Report available from the State of Washington Department of Labor and Industries, Electrical Inspection Division. Any NRTL listing/labeling shall be as accepted by the local authority having jurisdiction.
3. When a product is not available with a testing laboratory listing for the purpose for which it is to serve, the product may be required by the inspection authority to undergo a special inspection at the manufacturer's place of assembly. All costs and expenses incurred for such inspections shall be included in the original contract price.

##### **C. Required Performance**

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1. The sizing of the generator is the minimum rating acceptable for the project. The generator supplier shall increase the rating of the generator if necessary to meet the requirements of the specification.
2. The electrical loads required to be powered are shown on the one line diagrams. The required steps are as indicated:
  - a. Pump Station No.2:
    - 1) Step 1: Power panels including lighting and heating loads.
    - 2) Step 2: One 20 HP FVNR pump at PS2, and one 20 HP FVNR pump at PS#8 (2 pumps running)
    - 3) Step 3: One additional 20 HP FVNR pump at PS2, and one additional 20 HP FVNR pump at PS#8. (4 pumps running)
    - 4) Step 4: One additional 20 HP FVNR pump at PS2, and one 20 HP FVNR pump at PS#8. (6 pumps running)
  - b. Pump Station No.3:
    - 1) Step 1: Power panels including lighting and heating loads.
    - 2) Step 2: One 10 HP FVNR pump.
    - 3) Step 3: One additional 10 HP FVNR pump. (2 pumps running)
    - 4) Step 4: One additional 10 HP FVNR pump. (3 pumps running)
3. The performance of the generator set shall be based on operation of the assembly with fan, battery charging alternator and all specified and required appurtenances.
4. The generator set shall be rated for continuous standby service, however the temperature rise of the generator shall not exceed 105 degrees C above a 40 degree C ambient, when producing full rated load for a continuous period of time.
5. The engine generator unit supplied must start the indicated loads with a sustained RMS voltage drop no greater than 25% of rated phase to phase voltage during the starting period. The starting period shall be from zero up to 3 seconds. The instantaneous voltage dip may be greater than 25% but shall not cause motor starter chatter or relay drop out or exceed a level which causes undesirable motor starting.
  - a. If motor starting problems are encountered the size of the generator set shall be increased as required to reduce voltage dip until the motors can be started without problems. No additional cost shall be incurred by the Owner for the increased size of the generator set.
6. Frequency regulation shall be plus or minus 3 hertz maximum, no load to rated load. Voltage regulation shall be plus or minus 2% maximum.

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7. The generator set shall be sized by the manufacturer to start and operate the load indicated herein while meeting the performance requirements set forth herein. The minimum acceptable engine generator set shall be capable of producing power for the loads and ratings indicated on the drawing at .8 power factor, continuously.
8. The generator set output voltage shall be 480V/277Y, 3 Phase, 60 hertz.

### **D. Submittals**

1. In accordance with the Submittals requirement in Section 16010, the following information shall be submitted by the Contractor prior to placement of a purchase order for the equipment:
  - a. Wiring diagrams with details specific to this project showing all interface points and terminal numbers clearly identified.
  - b. Specific information on the components provided for this project and all optional equipment provided.
  - c. Operations and programming/adjustments manual.
  - d. Specific detailed information on the control features, their ranges, recommended set points etc.
  - e. Detailed plan and elevation drawings of the generator set indicating overall dimensions and the specific location of all components, including the engine exhaust system, fuel tank, and enclosure.
  - f. Detailed drawings indicating installation requirements and the specific location of vibration isolators and seismic snubbers.
  - g. Detailed plan of the face of the control panel indicating overall dimensions and the specific location of all components.
  - h. Detailed specifications and standard operating characteristics of the engine, the generator and all components.
  - i. Certification by the manufacturer and documentation that appropriate linear and torsional vibration analyses have been performed and that engine and generator are compatible units.
  - j. Certification by the manufacturer and documentation that the generator set will meet or exceed the general requirements as specified in Paragraph 1.02 of this section and the required performance as specified in Paragraph 1.04 of this section.
  - k. Generator control schematic.
  - l. Engine control schematic.
  - m. Certification by the engine manufacturer of review and approval of the proposed engine application.

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- n. Certification by the generator manufacturer of review and approval of the proposed generator application.
  - o. Detailed specifications and drawing of the fuel system and connections.
  - p. Detailed specifications and drawings of the installation of the engine exhaust system.
  - q. Detailed drawing showing generator plan and elevation views as proposed to be installed in the building, including all required electrical and mechanical Code clearances.
- 2. Installation details shall include the size, number, type and location of vibration isolators, seismic snubbers and anchor bolts; the size, number, type and location of interconnecting wiring and conduit; installation of the generator set and all appurtenances (including exhaust system), and other installation requirements. Shop drawings shall be submitted to the Contractor for review and approval.
  - 3. After break-in and testing of the generator set, the following project data shall be submitted by the Contractor:
    - a. Certified results of testing of the engine by the engine manufacturer.
    - b. Certified results of testing of the generator by the generator manufacturer.
    - c. Certified results of break-in and testing of the generator set by the manufacturer of the assembly.

### **E. Warranty**

- 1. The Contractor shall guarantee the generator set to be free of defects in design, materials and workmanship for a period of five (5) years following the date of acceptance, by formal action of the Owner, of all work under the contract. The guarantee shall include all parts and labor and shall be secured by a written guarantee from the manufacturer to the Owner. The written guarantee shall be delivered to the Owner prior to date of acceptance of all work under the Contract.

## **PART 2 - PRODUCTS**

### **A. Acceptable Manufacturers**

The generator set shall be manufactured by one of the following acceptable manufacturers:

- 1. CUMMINS ONAN
- 2. CATERPILLAR

## **SECTION 16200 – STANDBY GENERATOR**

3. The dimensional data for the sizing of the generator is from CUMMINS ONAN. The equipment of the manufacturer selected must fit within the space restrictions as shown on the plans and operate the equipment specified.
4. The Contractor is responsible for all costs associated with modifications to the mounting pad and accessories based on the equipment submitted for the project.

### **B. Generator set**

#### **1. Ratings**

- a. The generator set shall operate at a voltage of: 277Y/480V, 3 Phase, 60 hertz.
- b. The generator set shall be rated as shown on the one line diagram, based on site conditions of: Altitude: 40' above Sea level, ambient temperatures up to 100 degrees F.
- c. The generator set rating shall be based on standby service.

### **C. Performance**

1. Voltage regulation shall be plus or minus 0.5 percent for any constant load between no load and rated load. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.
2. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.5%.
3. The engine-generator set shall accept a single step load of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
4. Motor starting capability shall required for the loads shown on the drawings. The generator set shall be capable of recovering to a minimum of 90% of rated no load voltage following the application of the specified kVA load at near zero power factor applied to the generator set. Maximum voltage dip on application of this load, considering both alternator performance and engine speed changes shall not exceed 25%.
5. The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic, and no 3<sup>rd</sup> order harmonics or their multiples.
6. The generator set shall be certified by the engine manufacturer to be suitable for use at the installed location and rating, and shall meet all applicable exhaust emission requirements at the time of commissioning.

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### D. Construction

1. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails.
2. All switches, lamps, and meters in the control system shall be oil-tight and dust-tight. All active control components shall be installed within a UL/NEMA 3R enclosure. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts.

### E. Connections

1. The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations of the number and type as shown on the drawings. Sufficient lug space shall be provided for use with cables of the number and size as shown on the drawings.
2. Power connections to auxiliary devices shall be made at the devices, with required protection located at a wall-mounted common distribution panel.
3. Generator set control interfaces to other system components shall be made on a permanently labeled terminal block assembly. Labels describing connection point functions shall be provided.

### F. Engine

1. The engine shall be 4 cycle, radiator and fan cooled, 1800 RPM. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Two cycle engines are not acceptable. Engine accessories and features shall include:
  - a. An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed. The governing system shall include a programmable warm up at idle and cooldown at idle function. While operating in idle state, the control system shall disable the alternator excitation system.
  - b. Skid-mounted radiator and cooling system rated for full load operation in 122 degrees F (50 degrees C) ambient as measured at the alternator air inlet. Radiator fan shall be suitable for use in a system with 0.5 in H<sub>2</sub>O restriction. Radiator shall be sized based on a core temperature that is 20F higher than the rated operation

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temperature, or prototype tested to verify cooling performance of the engine/radiator/fan operation in a controlled environment. Radiator shall be provided with a duct adapter flange. The equipment manufacturer shall fill the cooling system with a 50/50-ethylene glycol/water mixture prior to shipping. Rotating parts shall be guarded against accidental contact.

- c. Electric starter(s) capable of three complete cranking cycles without overheating.
- d. Positive displacement, mechanical, full pressure, lubrication oil pump.
- e. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.
- f. An engine driven, mechanical, positive displacement fuel pump. Fuel filter with replaceable spin-on canister element. Fuel cooler, suitable for operation of the generator set at full rated load in the ambient temperature specified shall be provided if required for operation due to the design of the engine and the installation.
- g. Replaceable dry element air cleaner with restriction indicator.
- h. Flexible supply and return fuel lines.
- i. Engine mounted battery charging alternator, 40-ampere minimum, and solid-state voltage regulator.

### G. Coolant Heater

- a. Engine mounted, thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be as shown on the project drawings. The coolant heater shall be UL499 listed and labeled.
- b. The coolant heater shall be installed on the engine with silicone hose connections. Steel tubing shall be used for connections into the engine coolant system wherever the length of pipe run exceeds 12 inches. The coolant heater installation shall be specifically designed to provide proper venting of the system. The coolant heaters shall provisions to isolate the heater for replacement of the heater element without draining the coolant from the generator set. The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.
- c. The coolant heater shall be provided with a DC thermostat, installed at the engine thermostat housing. An AC power connection box shall be provided for a single AC power connection to the coolant heater system.
- d. The coolant heater(s) shall be sized as recommended by the engine

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manufacturer to warm the engine to a minimum of 104F (40C) in a 40F (4C) ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

- e. Provide vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer. Isolators shall include seismic restraints if required by site location.
- f. Starting and Control Batteries shall be calcium/lead antimony type, 24 volt DC, sized as recommended by the engine manufacturer, complete with battery cables and connectors. The batteries shall be capable of a minimum of three complete 15-second cranking cycles at 40F ambient temperature when fully charged.
- g. Specify special silencer type if required by the application.
- h. Provide exhaust silencer(s) for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. The mufflers shall be critical grade. Exhaust system shall be installed according to the engine manufacturer's recommendations and applicable codes and standards.
- i. Provide a minimum 12 amp battery charger for each generator set battery bank. Generator sets incorporating two battery banks shall be provided with two chargers connected together and operating in parallel, with alarm output(s) connected in parallel. The charger(s) shall include the following capabilities:
  - 1) Chargers shall be UL 1236-BBHH listed and CSA or CUL certified for use in emergency applications.
  - 2) The charger shall be compliant with UL991 requirements for vibration resistance.
  - 3) The charger shall comply with the requirements of EN61000-4-5 for voltage surge resistance; EN50082-2 for immunity; EN61000-4-2 for ESD; EN61000-4-3 for radiated immunity; ANSI/IEEE C62.41 category B and IN61000-4-4 for electrically fast transient; EN61000-4-6 for conducted emissions; and FCC Part 15 Class A for radiated emissions.
  - 4) The charger shall be capable of charging a fully discharged battery without damage to the charger. It shall be capable of returning a fully discharged battery to fully charged condition within 24 hours. The charger shall be UL-labeled with the maximum battery amp-hour rating that can be recharged within 24 hours. The label shall indicate that the charger is suitable for charging of 200AH batteries per NFPA requirements.



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- 5) The charger shall incorporate a 4-state charging algorithm, to provide trickle charge rate to restore fully discharged batteries, a bulk charge rate to provide fastest possible recharge after normal discharge, an absorption state to return the battery to 100 percent of charge, and a float stage to maintain a fully charge battery and supply battery loads when the generator set is not operating. In addition, the charger shall include an equalization timer. Charge rates shall be temperature compensated based on the temperature directly sensed at the battery.
- 6) The DC output voltage regulation shall be within plus or minus 1%. The DC output ripple current shall not exceed 1 amp at rated output current level.
- 7) The charger shall include the following features:
  - a) Two line alphanumeric display with programming keys to allow display of DC output ammeter and voltmeters (5% accuracy or better), display alarm messages, and perform programming;
  - b) LED indicating lamp(s) to indicating normal charging condition (green), equalize charge state (amber), and fault condition (red);
  - c) AC input overcurrent, over voltage, and undervoltage protection;
  - d) DC output overcurrent protection;
  - e) Alarm output relay
  - f) Corrosion resistant aluminum enclosure

### H. AC Generator

1. The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system and shall be UL1446 listed.
2. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.
3. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at

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approximately 300% of rated current for not more than 10 seconds.

4. The subtransient reactance of the alternator shall not exceed 15 percent, based on the standby rating of the generator set.

### I. Generator set Control

1. The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.
2. The control shall be mounted on the generator set, or may be mounted in a free-standing panel next to the generator set if adequate space and accessibility is available. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.
3. The generator set mounted control shall include the following features and functions:
  - a. Mode Select Switch. The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position the generator set shall start, and accelerate to rated speed and voltage as directed by the operator. A separate push-button to initiate starting is acceptable. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.
  - b. EMERGENCY STOP switch. Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.
  - c. RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
  - d. PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.

### J. Generator Set AC Output Metering.

1. The generator set shall be provided with a metering set including the following features and functions:
  - a. Digital metering set, 1% accuracy, to indicate generator RMS

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voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.

- b. Analog voltmeter, ammeter, frequency meter, power factor meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Meter scales shall be color coded in the following fashion: green shall indicate normal operating condition, amber shall indicate operation in ranges that indicate potential failure, and red shall indicate failure impending. Metering accuracy shall be within 1% at rated output. Both analog and digital metering are required.
- c. The control system shall monitor the total load on the generator set, and maintain data logs of total operating hours at specific load levels ranging from 0 to 110% of rated load, in 10% increments. The control shall display hours of operation at less than 30% load and total hours of operation at more than 90% of rated load.
- d. The control system shall log total number of operating hours, total kWh, and total control on hours, as well as total values since reset.

### K. Generator Set Alarm and Status Display.

- 1. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. Functions indicated by the lamps shall include:
  - a. The control shall include five configurable alarm-indicating lamps. The lamps shall be field adjustable for any status, warning, or shutdown function monitored by the genset. They shall also be configurable for color, and control action (status, warning, or shutdown).
  - b. The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.
  - c. The control shall include a flashing red lamp to indicate that the control is not in automatic state, and red common shutdown lamp.
  - d. The control shall include an amber common warning indication lamp.
- 2. The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. All conditions indicated below

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for warning shall be field-configurable for shutdown. Conditions required to be annunciated shall include:

- a. low oil pressure (warning)
- b. low oil pressure (shutdown)
- c. oil pressure sender failure (warning)
- d. low coolant temperature (warning)
- e. high coolant temperature (warning)
- f. high coolant temperature (shutdown)
- g. high oil temperature (warning)
- h. engine temperature sender failure (warning)
- i. low coolant level (warning)
- j. fail to crank (shutdown)
- k. fail to start/overcrank (shutdown)
- l. overspeed (shutdown)
- m. low DC voltage (warning)
- n. high DC voltage (warning)
- o. weak battery (warning)
- p. low fuel-daytank (warning)
- q. high AC voltage (shutdown)
- r. low AC voltage (shutdown)
- s. under frequency (shutdown)
- t. over current (warning)
- u. over current (shutdown)
- v. short circuit (shutdown)
- w. over load (warning)
- x. emergency stop (shutdown)
- y. (4) configurable conditions
- z. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

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### L. Engine Status Monitoring.

1. The following information shall be available from a digital status panel on the generator set control :
  - a. engine oil pressure (psi or kPA)
  - b. engine coolant temperature (degrees F or C)
  - c. engine oil temperature (degrees F or C)
  - d. engine speed (rpm)
  - e. number of hours of operation (hours)
  - f. number of start attempts
  - g. battery voltage (DC volts)
2. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.

### M. Engine Control Functions

1. The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.
2. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled.
3. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.
4. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.
5. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure conditions.

### N. Alternator Control Functions:

1. The generator set shall include a full wave rectified automatic digital voltage regulation system that is matched and prototype tested by the engine manufacturer with the governing system provided. It shall be

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immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase line to neutral RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate, and be capable of being curve-matched to the engine torque curve with adjustments in the field. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.

2. A microprocessor-based protection device shall be provided to individually monitor all phases of the output current of the generator set and initiate an alarm (over current warning) when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The device shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (over current shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.
3. A microprocessor-based protection device shall be provided to monitor all phases of the output current for short circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.
4. Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition (over load) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.
5. A microprocessor-based AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds. The system shall monitor individual phases and be connected line to neutral on 3-phase 4-wire generator sets, and for systems that are solidly grounded.

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6. When required by National Electrical Code or indicated on project drawings, the control System shall include a ground fault monitoring relay. The relay shall be adjustable from 3.8-1200 amps, and include adjustable time delay of 0-10.0 seconds. The relay shall be for indication only, and not trip or shut down the generator set. Note bonding and grounding requirements for the generator set, and provide relay that will function correctly in system as installed.
  7. The generator set control shall include a 120VAC-control heater.
- O. Control Interfaces for Remote Monitoring:
1. The control system shall provide four programmable output relays. These relay outputs shall be configurable for any alarm, shutdown, or status condition monitored by the control. The relays shall be configured to indicate: (1) generator set operating at rated voltage and frequency, (2) common warning, (3) common shutdown, (4) load shed command.
  2. A fused 10 amp switched 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit whenever the generator set is running.
  3. A fused 10 amp 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit at all times from the engine starting/control batteries.
- P. Additional equipment
1. Output Circuit Breaker and Disconnecting Means  
The generator set shall be provided with a mounted main line circuit breaker, sized to carry the rated output current of the generator set. The circuit breaker shall incorporate an electronic trip unit that operates to protect the alternator under all overcurrent conditions, or a thermal-magnetic trip with other overcurrent protection devices that positively protect the alternator under overcurrent conditions. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided.
  2. The generator supplier and electrical contractor shall coordinate to provide a separately mounted disconnecting means that meets the requirements of NEC article 701.11(5), and the approval of the AHJ.
- Q. Sound Attenuated Enclosure
1. The generator set enclosure shall be sound-attenuated and allow the generator set to operate at full rated load in an ambient temperature of up to 100F. The enclosure shall reduce the sound level of the generator set while operating at full rated load to a maximum of 75 dBA at any location

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7 meters from the generator set in a free field environment.

2. The enclosure shall be insulated with non-hygroscopic materials.
3. The generator set enclosure shall be listed under UL2200. The package shall comply with the requirements of the National Electrical Code for all wiring materials and component spacing. The total assembly of generator set, enclosure, and sub-base fuel tank (when used) shall be designed to be lifted into place using spreader bars. Housing shall provide ample airflow for generator set operation at rated load in an ambient temperature of 100F. The housing shall have hinged access doors as required to maintain easy access for all operating and service functions. All doors shall be lockable, and include retainers to hold the door open during service. Enclosure roof shall be cambered to prevent rainwater accumulation. Openings shall be screened to limit access of rodents into the enclosure. All electrical power and control interconnections shall be made within the perimeter of the enclosure.
4. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturers standard color using a two step electrocoating paint process, or equal meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating that meets the following requirements:
  - a. Primer thickness, 0.5-2.0 mils. Top coat thickness, 0.8-1.2 mils.
  - b. Gloss, per ASTM D523-89, 80% plus or minus 5%. Gloss retention after one year shall exceed 50%.
  - c. Crosshatch adhesion, per ASTM D3359-93, 4B-5B.
  - d. Impact resistance, per ASTM D2794-93, 120-160 inch-pounds.
  - e. Salt Spray, per ASTM B117-90, 1000+ hours.
  - f. Humidity, per ASTM D2247-92, 1000+ hours.
  - g. Water Soak, per ASTM D2247-92, 1000+ hours.
5. Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion resistant, and designed to minimize marring of the painted surface when removed for normal installation or service work.
6. Enclosure shall be constructed of minimum 12 gauge steel for framework and 14 gauge steel for panels. All hardware and hinges shall be stainless steel.
7. A factory-mounted exhaust silencer shall be installed inside the enclosure. The exhaust shall exit the enclosure through a rain collar and terminate with a rain cap. Exhaust connections to the generator set shall be through seamless flexible connections.



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8. The enclosure shall include the following maintenance provisions:
9. Flexible coolant and lubricating oil drain lines, that extend to the exterior of the enclosure, with internal drain valves
10. External radiator fill provision.

### **R. FUEL SYSTEM**

1. The generator shall be designed with a dual fuel system to operate on natural gas as the primary source, and shall automatically switch to the on-site LPG source if the natural gas source fails.
2. The fuel system shall be plumbed to the generator set skid for ease of site connections to the generator set.
3. Provide all required tanks, piping, fittings, valves etc required for a complete and operational system.

## **PART 3 - EXECUTION**

### **3.1 FACTORY TESTING**

- A. The generator set manufacturer shall perform a complete operational test on the generator set prior to shipping from the factory. A certified test report shall be provided. Equipment supplied shall be fully tested at the factory for function and performance.
- B. Generator set factory tests on the equipment shall be performed at rated load and rated power factor. Generator sets that have not been factory tested at rated power factor will not be acceptable. Tests shall include: run at full load, maximum power, voltage regulation, transient and steady-state governing, single step load pickup, and function of safety shutdowns.
- C. Installation
  1. Equipment shall be installed by the contractor in accordance with final submittals and contract documents. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.
  2. Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the on-site power system. The contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.
  3. Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with

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manufacturer's instructions and seismic requirements of the site.

4. Equipment shall be initially started and operated by representatives of the manufacturer.
5. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to initial operation and final testing of the system.

### **D. Acceptance testing**

1. The complete installation shall be tested for compliance with the specification following the completion of all site work. Testing shall be conducted by representatives of the manufacturer, with required fuel supplied by Contractor. The Engineer shall be notified in advance and shall have the option to witness the tests.
2. Installation acceptance tests to be conducted on-site shall include a "cold start" test, a two hour full load test, and a one-step rated load pickup test in accordance with NFPA 110. Provide a resistive load bank and make temporary connections for full load test, if necessary.
3. Perform a power failure test on the entire installed system. This test shall be conducted by opening the power supply from the utility service, and observing proper operation of the system for at least 2 hours. Coordinate timing and obtain approval for start of test with site personnel.
4. The Contractor shall provide fuel for startup testing, calibration and adjustment. The Contractor shall provide the Owner with a full tank of fuel upon completion of the project.

### **E. Training**

1. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than 4 hours in duration and the class size shall be limited to 5 persons. Training date shall be coordinated with the facility owner.

### **F. Service and support**

1. The manufacturer of the generator set shall maintain service parts inventory at a central location which is accessible to the service location 24 hours per day, 365 days per year.
2. The location of the service center shall be located within 50 miles of the project location.
3. The generator set shall be serviced by a local service organization that is trained and factory certified in generator set service. The supplier shall

## **SECTION 16200 – STANDBY GENERATOR**

maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.

4. The manufacturer shall maintain model and serial number records of each generator set provided for at least 20 years.

### **G. Warranty**

1. The generator set and associated equipment shall be warranted for a period of not less than 5 years from the date of commissioning against defects in materials and workmanship.
2. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.

END OF SECTION 16200



## **SECTION 16450 - GROUNDING**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. This specification describes the requirements for the grounding of electrical systems and equipment.
- B. Installation shall be in accordance with the National Electrical Code (NEC) article 250.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- 1. Ground wire: Soft drawn bare stranded copper wire, sized as noted on the drawings.
- 2. Terminals and connectors: Burndy Hyground compression system.
- 3. Exothermic type weld: Erico Cadweld process, or Furseweld/T&B corp. Exothermic welding system.
- 4. Rod Electrodes: Copper clad (minimum 0.010 jacket) ground rods minimum 3/4" diameter x 8' long.
- 5. Grounding Electrode conductors and bonding conductors: Copper conductors, bare or insulated, as shown on drawings.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- 1. All contacting surfaces of ground connections shall be cleaned to bright metal before connection is made.

#### **3.2 INSTALLATION**

- 1. Grounding conductors: Install in PVC conduit where subject to damage. All grounding conductors smaller than #6 AWG must be protected.
- 2. Connections and splices: Provide as required and as shown on drawings.
- 3. Connections, taps, and splices shall be made by compression connectors, Burndy Hyground compression system.
- 4. Provide equipment grounding conductor in all PVC conduits.

END OF SECTION 16450



## **SECTION 16496 – AUTOMATIC TRANSFER SWITCH**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION OF WORK**

- A. This section specifies the requirements of all automatic transfer switches in individual enclosures for system rated 600 volts and less.
- B. Programmed Open Transition: All switches provided for the project shall be capable of remaining in the neutral position for an adjustable time of 1 to 30 seconds when transferring between two live sources, to allow the residual voltages to completely decay before transfer.
- C. Provide complete factory assembled power transfer equipment with electronic controls designed for designed for fully automatic operation and including: surge voltage isolation, voltage sensors on all phases of the normal source and one phase of the emergency source, positive mechanical and electrical interlocking, and mechanically held contacts for both sources.

#### **1.2 STANDARDS AND CODES**

- A. All equipment, materials, and the design, construction, installation, and application thereof shall comply with all applicable provisions of the National Electrical Code (NEC), the Occupational Safety and Health Act (OSHA), and any applicable federal, State, and local ordinances, rules and regulations. All materials and equipment specified herein shall be within the scope of Nationally Recognized Testing Laboratory (NRTL) examination services, be approved by the NRTL for the purpose for which they are used, and shall bear the appropriate listing label.
- B. The automatic transfer switch shall conform to the requirements of the following codes and standards:
  - 1. UL1008. The transfer switch shall be UL listed and labeled.
  - 2. CSA C22.2, No. 14 – M91 Industrial Control Equipment.
  - 3. CSA 282, Emergency Electrical Power Supply for Buildings
  - 4. IEEE Standard C62.41 and C62.45.
  - 5. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
  - 6. NFPA99 – Essential Electrical Systems for Health Care Facilities
  - 7. NFPA110 – Emergency and Standby Power Systems. The transfer switch shall meet all requirements for Level 1 systems.
  - 8. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.

## **SECTION 16496 – AUTOMATIC TRANSFER SWITCH**

### **9. NEMA ICS10-1993 – AC Automatic Transfer Switches.**

#### **1.3 RELATED DOCUMENTS**

- A. Related Documents: the provisions and intent of the Contract, the General and Supplementary Conditions, and Section 01 specification Sections, apply to the Work as if specified in this Section.
- B. Related Sections:
  - 1. Section 16010 for enclosure and cabinet supports.

#### **1.4 COORDINATION**

- A. The Electrical Contractor shall be responsible for furnishing and installing the automatic transfer switch, interconnecting wiring, and all related equipment as shown on the drawings and as specified herein.

#### **1.5 REFERENCES**

- A. ANSI/NEMA ICS 10 (National Electrical Manufacturers Association) – AC Transfer Switch Equipment.
- B. ANSI/UL 1008 – Automatic Transfer Switches.
- C. NETA ATS (International Electrical Testing Association) – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum 10 years documented experience, and with service facilities within 100 miles of Project site capable of providing training, parts, and emergency maintenance and repairs.
- B. Supplier: Authorized distributor of specified manufacturer with minimum 10 years documented experience.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100 and marked for intended use for the location and environment in which they are installed.
- D. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

#### **1.7 SUBMITTALS**

- A. Comply with Section 16010, Electrical General.
- B. Product Data: Submit catalog sheets showing voltage, switch size, ratings and size



## **SECTION 16496 – AUTOMATIC TRANSFER SWITCH**

of switching and overcurrent protective devices, operating logic, short circuit ratings, dimensions, and enclosure details. Include mounting and anchorage requirements to maintain seismic compliance. Include compliance with seismic rating and labeling requirements.

- C. Seismic Qualification Certification: Submit certification that transfer switches, accessories, and components will withstand seismic forces as required by local codes. Include the following:
  - 1. Basis of Certification: Verify whether withstand certification is based on actual test of assembled components.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
  - 4. Operations and Maintenance Data: Comply with Section 16010 Operations and Maintenance Data.

### **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to internal components, enclosure, and finish.

### **1.9 WARRANTY**

- A. The Contractor shall guarantee the ATS set to be free of defects in design, materials and workmanship for a period of five (5) years following the date of acceptance, by formal action of the Owner, of all work under the contract. The guarantee shall include all parts and labor and shall be secured by a written guarantee from the manufacturer to the Owner. The written guarantee shall be delivered to the Owner prior to date of acceptance of all work under the Contract.

## **PART 2 - PRODUCTS**

### **2.1 AUTOMATIC TRANSFER SWITCH**

#### **A. GENERAL**

- 1. Provide One (1) automatic system load transfer switch. Unless otherwise specified, the Automatic Transfer Switch manufacturer shall be the same as the Generator manufacturer.

## SECTION 16496 – AUTOMATIC TRANSFER SWITCH

### B. Ratings

1. Refer to the project drawings for specifications on the sizes and types of transfer switch equipment, withstand and closing ratings, number of poles, voltage and ampere ratings, enclosure type, and accessories.
2. The transfer switch shall be selected to fit in the panel or space allocated for the equipment. The contractor shall be responsible to supply a larger panel or other accommodations, if required to meet space requirements.
3. Main contacts shall be rated for the operation voltage as installed.
4. Transfer switches shall be rated to carry 100 percent of rated current continuously in the enclosure supplied, in ambient temperatures of -40 to +60 degrees C, relative humidity up to 95% (non-condensing), and altitudes up to 10,000 feet (3000M).
5. Transfer switch equipment shall have withstand and closing ratings (WCR) in RMS symmetrical amperes greater than the available fault currents shown on the drawings. The transfer switch and its upstream protection shall be coordinated. The transfer switch shall be third party listed and labeled for use with the specific protective device(s) installed in the application.

### C. CONSTRUCTION

1. Transfer switches shall be double-throw, electrically and mechanically interlocked, and mechanically held in the source 1 and source 2 positions.
2. Transfer switch internal wiring shall be composed of pre-manufactured harnesses that are permanently marked for source and destination. Harnesses shall be connected to the control system by means of locking disconnect plug(s), to allow the control system to be easily disconnected and serviced without disconnecting power from the transfer switch mechanism.
3. Transfer switch shall be provided with flame retardant transparent covers to allow viewing of switch contact operation but prevent direct contact with line voltage components.
4. Transfer switches shall be 3-pole and shall be provided with a neutral bus and lugs. The neutral bus shall be sized to carry 100% of the current designated on the switch rating.

### D. CONNECTIONS

1. Field control connections shall be made on a common terminal block that is clearly and permanently labeled.
2. Transfer switch shall be provided with mechanical lugs sized to accept the full output rating of the generator set.

## SECTION 16496 – AUTOMATIC TRANSFER SWITCH

### E. CONTROL

1. Solid-state under voltage sensors shall simultaneously monitor both sources. Pick-up and drop-out settings shall be adjustable. Voltage sensors shall have field calibration of actual supply voltage to nominal system voltage.
2. Automatic controls shall signal the engine-generator set to start upon signal from normal source sensor. Solid-state time delay start, adjustable from 0 to 15 seconds (factory set at 2 seconds) shall avoid nuisance start-ups. Battery voltage starting contacts shall be silver, dry type contacts factory wired to a field wiring terminal block.
3. The switch shall transfer when the emergency source reaches the set point. Provide a solid-state time delay on transfer, adjustable from 2 to 120 seconds, factory set at 3 seconds.
4. The switch shall be capable of remaining in the neutral position for an adjustable time of 1 to 30 seconds when transferring between two live sources, to allow the residual voltages to completely decay before transfer.
5. The switch shall retransfer the load to the normal source after a time delay retransfer, adjustable from 6 seconds to 30 minutes, factory set at 5 minutes. Retransfer time delay shall be immediately bypassed if the emergency power source fails.
6. Controls shall signal the engine-generator set to stop after a time delay, adjustable from 2 seconds to 10 minutes, and factory set at 5 minutes, beginning on return to the normal source.
7. The control system shall include field adjustable provisions to control the speed of transfer of the transfer switch.
8. Power for transfer operation shall be from the source to which the load is being transferred.
9. The control shall include latching diagnostic indicators to pinpoint the last successful step in the sequence of control functions, and to indicate the present status of the control functions in real time.

### F. FRONT PANEL DEVICES:

1. Provide control switches mounted on cabinet front for:
  - a. Test - Simulates normal power loss to control for testing of generator set. Controls shall provide for a test with or without load transfer.
  - b. Retransfer - Momentary position to override retransfer time delay and cause immediate return to normal source, if available.
  - c. Provide LED-type switch position and source available indicator lamps on the front of the transfer switch cabinet.

## SECTION 16496 – AUTOMATIC TRANSFER SWITCH

- d. Provide manual override switch to bypass the control system and transfer load from source to source when control is disabled.

### G. CONTROL INTERFACE

1. The transfer switch will provide an isolated relay contact for starting of a generator set. The relay shall be normally held open, and close to start the generator set. Output contacts shall be form C, for compatibility with any generator set.
2. Provide one set Form C auxiliary contacts on both sides, operated by transfer switch position, rated 10 amps 250 VAC.
3. The transfer switch shall provide relay contacts to indicate the following conditions: source 1 available, load connected to source 1, source 2 available, source 2 connected to load.

### H. ENCLOSURE

1. Enclosures shall be UL listed. The cabinet door shall be key-locking.
2. Transfer switch equipment shall be provided in a NEMA 12 enclosure for indoor installations, or NEMA 3R enclosure for outdoor installations, or as shown on the plans.
3. Enclosures shall be the NEMA type specified. The cabinet shall provide code-required wire bend space at point of entry as shown on the drawings. Manual operating handles and all control switches (other than key-operated switches) shall be accessible to authorized personnel only by opening the key-locking cabinet door. Transfer switches with manual operating handles and/or non key-operated control switches located on outside of cabinet do not meet this specification and are not acceptable.

## 2.2 OPERATION

### A. Programmable Open Transition Sequence of Operation

1. Transfer switch normally connects an energized utility power source (source 1) to loads and a generator set (source 2) to the loads when normal source fails. The normal position of the transfer switch is source 1 (connected to the utility), and no start signal is supplied to the genset.
2. The switch shall be capable of remaining in the neutral position for an adjustable time of 1 to 30 seconds when transferring between two live sources, in both directions, to allow the residual voltages to completely decay before transfer.
3. Generator Set Exercise (Test) With Load Mode. The control system shall be configurable to test the generator set under load. In this mode, the transfer switch shall control the generator set in the following sequence:

## SECTION 16496 – AUTOMATIC TRANSFER SWITCH

- a. Transfer switch shall initiate the exercise sequence at a time indicated in the exercise timer program, or when manually initiated by the operator.
  - b. When the control systems senses the generator set at rated voltage and frequency, it shall operate to connect the loads to the generator set by opening the normal source contacts, and closing the alternate source contacts a predetermined time period later. The timing sequence for the contact operation shall be programmable in the controller.
  - c. The generator set shall operate connected to the load for the duration of the exercise period. If the generator set fails during this period, the transfer switch shall automatically reconnect the generator set to the normal service.
  - d. On completion of the exercise period, the transfer switch shall operate to connect the loads to the normal source by opening the alternate source contacts, and closing the normal source contacts a predetermined time period later. The timing sequence for the contact operation, including time in the neutral position, shall be programmable in the controller.
  - e. The transfer switch shall operate the generator set unloaded for a cooldown period, and then remove the start signal from the generator set. If the normal power fails at any time when the generator set is running, the transfer switch shall immediately connect the system loads to the generator set.
4. Generator Set Exercise (Test) Without Load Mode. The control system shall be configurable to test the generator set without transfer switch load connected. In this mode, the transfer switch shall control the generator set in the following sequence:
- a. Transfer switch shall initiate the exercise sequence at a time indicated in the exercise timer program, or when manually initiated by the operator.
  - b. When the control systems senses the generator set at rated voltage and frequency, it shall operate the generator set unloaded for the duration of the exercise period.
  - c. At the completion of the exercise period, the transfer switch shall remove the start signal from the generator set. If the normal power fails at any time when the generator set is running, the transfer switch shall immediately connect the system loads to the generator set.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

## **SECTION 16496 – AUTOMATIC TRANSFER SWITCH**

- A. Install transfer switch on equipment rack as shown and indicated on drawings and complying with Section 16010.
- B. Comply with manufacturer's recommendations, drawings, and mounting and anchoring requirements.
- C. Ground equipment.
- D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.
- E. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- F. Mark lugs after torquing with red paint such that paint will be visibly disturbed if lugs are disturbed.

### **3.2 IDENTIFICATION**

- A. Identify transfer switch, transfer switch components, and control wiring according to Section 16010 "Electrical-General."
- B. Identify transfer switch name, designation, power sources, source locations, voltage, load served and load location.
- C. Equipment used in emergency systems shall be labeled "Suitable for use on emergency systems" per NEC 700-3.
- D. Operating Instructions: Include printed operating instructions for transfer switch, including control sequences and emergency procedures, inside door pocket or readily accessible location.

END OF SECTION 16496

## **SECTION 16910 – VARIABLE FREQUENCY DRIVES**

### **PART 1 GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. This section specifies AC pulse width modulated (PWM) Variable Frequency Drives (VFD) for operation on three phase, 60 cycle power.
- B. Provider of VFDs
  - 1. The VFDs shall be provided by the Control System Integrator as defined in section 16925. The VFD's shall be provided as a complete and operational system, integral to the MCC or other control panels, as shown on the drawings.

#### **1.02 SUBMITTALS**

- A. Submit all catalog data in accordance with the Submittals requirements in Section 16010. Show material information and confirm compliance with these specifications.
- B. In addition to the requirements of Section 16010, submittals shall include the following information:
  - 1. Outline Dimensions with exterior and interior equipment elevation drawings.
  - 2. Wiring diagrams with all interface points and terminal numbers clearly identified.
  - 3. Specific information on the VFDs components provided for this project and all optional equipment provided.
  - 4. Operations and programming manual.
- C. Warranty
  - 1. The Contractor shall guarantee the VFDs to be free of defects in design, materials and workmanship for a period of one (1) year following the date of acceptance, of all work under the contract. The guarantee shall include all parts and labor and shall be secured by a written guarantee from the Manufacturer to the Owner. The written guarantee shall be delivered to the Owner prior to date of acceptance of all work under the Contract.

### **PART 2 PRODUCTS**

#### **2.01 GENERAL**

- A. The variable frequency drive (VFD) motor controller shall convert 480 Volt,

## SECTION 16910 – VARIABLE FREQUENCY DRIVES

three-phase, 60 Hertz utility power to adjustable voltage and frequency (0 - 60 hertz) three-phase, AC power for motor speed control with a capability of 60:1 speed range. All general options and modifications shall mount within the standard adjustable frequency controller enclosure.

- B. The controller(s) shall be suitable for use with any standard configuration squirrel-cage induction motor(s) having a 1.15 Service Factor, or with existing standard squirrel-cage induction motor(s) with nameplate data as shown on the plans. At any time in the future, it shall be possible to substitute any standard motor (equivalent horsepower, voltage, and RPM) in the field.

### 2.02 SERVICE CONDITIONS

- A. The VFD shall be designed and constructed to operate within the following service conditions:
  - 1. Ambient Temperature Range: -10°C to 40°C
  - 2. Atmosphere: Non-Condensing relative humidity to 95%
  - 3. AC Line Voltage Variation: +/- 10%
  - 4. AC Line Frequency Variation:  $\pm 3$  Hertz

### 2.03 BASIC DRIVE

- A. Description
  - 1. The VFD shall produce an adjustable AC voltage/frequency output. It shall have an output voltage regulator to maintain correct output V/Hz despite incoming voltage variations.
  - 2. The VFD shall have a continuous output current rating of 100% of motor nameplate current.
  - 3. The VFD shall be of the Pulse Width Modulated type and employ a dual full-wave diode bridge converter to convert incoming fixed voltage/frequency to a fixed DC voltage. The Pulse Width Modulation strategy shall be of the space vector type implemented in a microprocessor which generates a sine-coded output voltage.
  - 4. The inverter output shall be generated by Insulated Gate Bipolar Transistors (IGBT) which shall be controlled by six identical base driver circuits. The worst case RMS motor line current measured at rated speed, torque and voltage shall not exceed 1.05 times the rated RMS motor current for pure sine wave operation.

### 2.04 KEYPAD OPERATOR INTERFACE

- A. The VFD shall be provided with a door mounted LCD keypad which will indicate (minimum):



## **SECTION 16910 – VARIABLE FREQUENCY DRIVES**

1. Frequency output
2. Voltage output
3. Current output
4. Motor RPM
5. Motor kW
6. Elapsed Time
7. Time stamped fault indication
8. DC bus Volts
9. Faults
10. Parameter settings.

### **2.05 ENCLOSURE**

- A. All VFD components shall be factory mounted and wired in an enclosure, meeting the requirements of 16010, Area Classifications. A ventilation system shall be provided to maintain the internal enclosure temperature within the operating conditions for the VFD. If a free-standing enclosure is provided, it shall be suitable for mounting on a concrete housekeeping pad.

### **2.06 PROTECTIVE CIRCUITS AND FEATURES**

- A. The VFD shall include the following protective circuits and features:
  1. Overload rating of 110% for 60 seconds, and 150% for 3 seconds.
  2. Output phase to phase short circuit condition.
  3. Total ground fault under any operating condition.
  4. High input line voltage
  5. Low input line voltage
  6. Loss of input or output phase
  7. Metal Oxide Varistors for surge suppression at the VFD input terminals.
- B. Diagnostic Features
  1. The VFD shall include a microprocessor based digital diagnostic system which shall monitor its own control functions and displays faults and operating conditions.
  2. A "FAULT LOG" shall record, store, and display the fifty (50) most recent fault events.
- C. Communications

## **SECTION 16910 – VARIABLE FREQUENCY DRIVES**

1. The VFD shall include an embedded EtherNet/IP port for configuration, control and collection of drive data over the network.
- D. I/O requirements
  1. The VFD shall include seven discrete inputs, two analog inputs, one analog output, and two relay outputs.
- E. Acceptable Manufacturers
  1. Acceptable Manufacturers shall provide equipment which meets all of the requirements of these specifications, and fit within the space requirements.
  2. Where VFDs are mounted integral to an MCC assembly, the MCC and VFD manufacturers shall be the same.
  3. VFD's shall be Allen Bradley Powerflex 525 series.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Installation shall be the responsibility of the Contractor. The Contractor shall install the drive in accordance with the contract drawings and as recommended by the VFD Manufacturer as outlined in the installation manual.
- B. Power and control wiring shall be completed by the Electrical Contractor. The Contractor shall complete all wiring in accordance with the recommendations of the VFD Manufacturer as outlined in the installation manual.

#### **3.02 QUALITY ASSURANCE**

- A. The controller shall be subject to, but not limited to, the following quality assurance controls, procedures and tests:
  1. Each VFD shall be functionally tested under motor load. During this load test the VFD shall be monitored for correct phase, current, voltages and motor speed. Correct current limiting operation shall be verified by simulating a motor overload. Manufacturing test data shall be recorded and stored by the manufacturer at the time of production.
  2. Verification of proper factory presets shall be performed on 100% of all parameters to ensure proper microprocessor settings. Verification that the proper factory settings are loaded correctly in the drive shall be done via the drive serial interface port.
  3. The drive assembly shall be tested for shock (15G peak for 11 ms duration) and vibration (-0152 mm displacement, 1G peak).

#### **3.03 START-UP**

## **SECTION 16910 – VARIABLE FREQUENCY DRIVES**

- A. Certified factory start-up shall be provided for each drive by a factory authorized service center. A certified start-up form shall be filled out for each drive with a copy provided to the Engineer, Owner, and a copy kept on file at the Manufacturer. Cost for this startup support shall be included in the VFD bid price. The Engineer shall be notified a minimum one (1) week in advance of the scheduled start-up.
- B. Where the application utilizes standby power generation, the VFDs shall be tested with both Utility and standby power sources. The VFD Representative shall make any and all adjustments and modifications to the VFDs to operate within specified limits, without additional cost to the owner. The Manufacturer's representative will be present during these tests.
- C. A list of all drive parameters and settings for each drive shall be provided to the Owner upon project completion.

### **3.04 OPERATION AND MAINTENANCE TRAINING**

- A. The Supplier shall conduct specifically organized training sessions in operation and maintenance of the VFD equipment 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 system. Training shall include, but not be limited to, the following:
  - 1. Preventative maintenance procedures
  - 2. Trouble-shooting
  - 3. Calibration
  - 4. Testing
  - 5. Replacement of components.
- B. At least one (1) training session, of at least four (4) hours in duration, shall be conducted after start-up of the system. The Supplier shall provide specific instruction materials for each training session and shall supply such materials to the Owner at least one (1) week prior to the time of the training.

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



## **SECTION 16920 – MOTOR CONTROL CENTERS**

### **PART 1 GENERAL**

#### **1.01 DESCRIPTION**

- A. This section specifies free standing, factory assembled Low Voltage (600 volt) Motor Control Centers (MCC).

#### **1.02 COORDINATION**

- A. The Contractor shall be responsible for furnishing the motor control center including all related equipment as shown on the drawings and as specified herein. The Electrical Contractor shall be responsible for installing the motor control center, interconnecting wiring and all related equipment.
- B. The Contractor shall coordinate equipment information with the MCC manufacturer so that the correct type of motor starters and protection equipment are provided and sized properly for the devices being served and to supply such equipment with the proper protection. The Contractor shall verify that all MCC equipment will fit physically within the space allotted per the contract drawings.
- C. The motor control center manufacturer shall equip the assembly with all appurtenances and accessories (including but not limited to control relays, control contacts, control wiring, and terminal strips) as required for interface with the main control system to provide a totally integrated and operable system.

#### **1.03 RELATED SECTIONS**

- A. Section 16925 – Instrumentation and control.
- B. Section 16910 – Variable Frequency Drives

#### **1.04 SUBMITTALS**

- A. In accordance with the Submittal requirements of Section 16010, the MCC manufacturer shall develop and submit to the following additional information:
- B. System wiring diagrams for each unit in the entire motor control center including but not limited to: all instruments, relays, starters, switches, lights, breakers terminals, etc. Diagrams shall indicate the terminals for remote devices as shown on the wiring diagrams in the contract drawings. Wire and terminal numbers shall be included on the schematic diagrams. Relay contacts shall be indicated for type and number available for each relay used.
- C. Information on ratings and sizes of all equipment such as control transformers, fuses, breakers, etc. on the wiring diagrams for each bucket including time current curves.

## **SECTION 16920 – MOTOR CONTROL CENTERS**

- D. Connection diagrams showing physical wiring layout for each unit.
- E. Technical data sheets for all components with the complete part number of the component clearly designated with all required options as specified in part 2.
- F. Scaled arrangement drawings of all panel front- and internal-mounted instruments, switches, devices, and equipment indicated. Show all mounting details required. Deviations from approved arrangements require resubmittal and approval prior to installation.
- G. Descriptive text on wire markers to be used.
- H. Bill of materials showing quantity, manufacturer, catalog number, and the supplier name and phone number for all components of the MCC.
- I. Shop Drawings shall be provided on 11" x 17" sheets (maximum) and shall be scaled using standard engineering or architectural scales.

### **1.05 COORDINATION OF EQUIPMENT**

- A. The Contractor shall coordinate equipment information with the MCC manufacturer so that the correct type of motor starters and protection equipment are provided and sized properly for the devices being served and to supply such equipment with the proper protection. The Contractor shall verify that all MCC equipment will fit physically within the space allotted per the contract drawings.
- B. Coordination with Control System
  - 1. The motor control center manufacturer shall equip the assembly with all appurtenances and accessories (including but not limited to control relays, control contacts, control wiring and terminal strips) as required by the Contractor for interface with the main control system to provide a totally integrated and operable system.
  - 2. The Contractor shall be solely and completely responsible for coordination and integration of control system with the motor control center.
- C. Operation and Maintenance Data
  - 1. Provide operation and maintenance data for all motor control center and related equipment in accordance to the general requirements in Section 16010 and 16925.

## **PART 2 PRODUCTS**

### **2.01 ACCEPTABLE PRODUCTS**

- A. The size of the MCC shown on the drawings is based on MCCs manufactured by Allen-Bradley. The MCC equipment provided must fit within the space

## SECTION 16920 – MOTOR CONTROL CENTERS

restrictions as shown on the plans.

- B. Motor control centers shall be Allen-Bradley NEMA 2100 Centerline series.

### 2.02 CONSTRUCTION

#### A. General

- 1. Motor control centers shall be designed, assembled, tested and placed into operation by the MCC supplier. The motor control center shall fit into the space requirements as shown on the drawings. The contract drawings show general MCC layout and space requirements and may be modified by the MCC manufacturer if first approved by the Engineer.

#### B. Structure

- 1. The MCC shall consist of vertical sections that can be joined together to form a rigid free-standing, completely enclosed assembly. Vertical sections shall be fabricated of bolted No. 14 gage steel minimum. Each section shall have flange formed doors and/or covers both front and rear. Doors shall include provisions for padlocking all breakers in the open position.

#### C. MCC construction shall be suitable for the environment installed.

- 1. Damp or dusty areas: MCCs shall be NEMA 12 construction. NEMA 12 is required for this project.

#### D. Arrangement

- 1. Motor control center sections shall have a minimum 72-inch working height to accommodate a minimum of six 12-inch compartments. Sections shall be 20 inches deep with a 90-inch height. Minimum width shall be 20 inches. Compartments shall have pan-type doors with quarter turn hold-down latches and neoprene gaskets. Doors for compartments with starter and feeder tap units shall be mechanically interlocked with the unit's disconnect device to prevent unintentional opening of the door while energized and unintentional application of power while the door is open.
- 2. Starters and feeder tap units shall be draw-out plug-in construction with hardened, plated copper free-floating stabs, steel spring backups, and interference tabs which prevent door closure if unit is improperly installed. Units shall be latched to assure proper bus contact.

#### E. Finish

- 1. All steel parts shall be provided with an acrylic baked enamel paint finish, except plated parts used for ground connections. Painted parts shall be primed with a zinc-phosphate primer or undergo a phosphatizing pre-paint treatment for rust resistance and paint bond. Paint shall be applied by

## SECTION 16920 – MOTOR CONTROL CENTERS

electrostatic process and baked to a durable hard finish. Exterior and structure color shall be ASA #49 gray. Starter bucket interiors shall be white.

### F. Wiring / Terminals

1. The motor control center shall be suitable for operation on 240 volts, three-wire, 60 hertz. Wiring shall be NEMA Class II, Type B. Each unit shall be completely prewired with all control wiring numbered and terminated on terminal strips. Terminal's numbering shall be coordinated between units such that like devices shall have the same terminal numbers. Wiring within one bucket shall be labeled with a basic wire numbering scheme.
2. A minimum of 5 spare terminals shall be provided in each unit. Terminal strips are not required for the load wiring. Auxiliary components, such as HOA selector switches, indicating lights and other indicating and/or recording devices, shall be mounted on the compartment door or cover. All control power leads into and out of each unit shall pass through auxiliary contacts of the circuit breaker or be equipped with their own disconnecting device or disconnecting terminal strips, appropriately labeled.

### G. Wireways

1. Full height vertical wireway shall be provided in each MCC section that accepts modular plug-in units. The vertical wireway shall connect with both the top and bottom horizontal wireway. The vertical wireway shall be 4" for a 20" wide (9" for a 25") wide section with a separately hinged door. Structures that house a single, full section control unit are not required to have vertical wireways. Those control units must open directly into the motor control center horizontal wireways.

### H. Bus

1. The motor control center bus shall be tin-plated copper with connections between vertical and horizontal power bus bars made with 3/8-inch bolts and conical dished steel washers. Access for tightening connections shall be from the front, without the need for tools on the rear of the connection.
2. Unless otherwise specified all sections shall contain horizontal and vertical busses. Each end of the line up shall be provided for connection of future sections.
3. Unless otherwise specified or required by the components installed, main horizontal bus shall be rated a minimum 600 amperes continuous, vertical bus shall be rated a minimum of 300 amperes continuous.
4. A 1/4" X 2" minimum un-plated copper ground bus shall be provided the full length of the motor control center. Ground bus shall be located at the



## SECTION 16920 – MOTOR CONTROL CENTERS

bottom of the motor control center and shall contain lugs to terminate, as a minimum, two (one at each end of ground bus) 4/0 AWG bare copper ground conductors.

### I. Variable Frequency Drives

1. See section 16910 – Variable Frequency Drives

### J. Motor Starter Units / Contactors

1. Motor starter units shall be of the combination type with components as indicated on the drawings. Magnetic contactors shall be heavy duty NEMA rated and shall be size 1 minimum. All contactors shall be provided with two field convertible auxiliary contacts. An auxiliary switch shall be provided to indicate the circuit breaker is in the "ON" position. Switch shall be open when the circuit breaker is open. Motor starters and associated equipment shall be provided to match the load being served.

#### 2. Overload Relays

- a. Thermal overload relays on starters shall be ambient compensated bi-metallic type or solid state type with selector for either auto or manual reset. Overload Relays shall monitor all energized conductors. Overload relay shall be provided with a circuit test button which shall simulate an overload trip, trip indication, and reset pushbutton.

#### 3. Control Transformers

- a. Each control transformer shall be rated 240-120 volt, single phase, 2 wire, 60 hertz. The transformer shall be sized for the load it feeds but shall not be less than the minimum ratings as follows:

<u>NEMA starter size</u>	<u>Minimum transformer volt-ampere rating</u>
--------------------------	---------------------------------------------------

1	100
2	150
3	200
4	300
5	500

- b. Each control transformer shall be provided with time-delay, slow blow secondary fuse rated to interrupt 10,000 amperes short circuit at 250 volts AC. Two primary fuses rated to interrupt 200,000 amperes at 600 volts shall be provided on all starters.

#### 4. Transient Suppressors

- a. All contactor coils shall be provided with transient suppressors to limit the high voltage transients produced when power is removed

## SECTION 16920 – MOTOR CONTROL CENTERS

from the coil.

### K. Circuit Breakers

#### 1. General

- a. Circuit breakers other than those mounted in the panelboard shall be capable of being padlocked in the open position.

#### 2. Motor Circuit Protectors

- a. Provide motor circuit protectors for all full voltage starters.
- b. The molded case motor circuit protector shall operate on the magnetic principle with a current sensing coil in each of the three poles to provide an instantaneous trip for short circuit protection. The trip setting shall be adjustable from 700 to 1300 percent of the motor full load amperes from the front of the breaker. The motor circuit protector shall be set at its lowest position at the factory. All breakers for motor starters shall include auxiliary contacts which open when the breaker in the OFF position.

#### 3. Thermal Magnetic

- a. Provide thermal magnetic circuit breakers for all reduced voltage starters and variable frequency drives.
- b. Circuit breakers shall be molded case thermal-magnetic type. Circuit breakers shall be quick-make and quick-break type. They shall have wiping type contacts. Each shall be provided with arc chutes, individual trip mechanisms on each pole. Two and three pole breakers shall be common trip. All breakers shall be calibrated for operation in an ambient temperature of 40°C. Molded case circuit breakers shall be trip-free. Each breaker shall have separate trip indication independent of the ON or OFF positions. Breakers shall also meet the requirements of Section 16180 - Overcurrent Protective Devices.

### L. Operating and Indicating Devices

#### 1. See section 16925 – Instrumentation and Control

#### 2. Ammeter & Voltmeter

- a. Voltmeter and voltmeter switch, ammeter and ammeter switch shall be provided where shown on the one-line diagram. Meters shall be analog type 4" nominal size, scaled for the application. . Switches shall be instrument grade cam switches, rated for 25 ampere. Volt meter switch shall read phase to phase and phase to ground. Ammeter switch shall read phases A, B, and C. Provide three CTs for each ammeter.

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3. Power Monitor and Display (PMD)
  - a. Power monitor and display unit shall be provided for each MCC. The unit shall monitor all three phases and shall display volts (phase to phase and phase to neutral), amperes, power factor, and hertz. The PMD shall be supplied with an Ethernet or equivalent for direct connection and communication to the PLC.
- M. Panelboard
  1. Panelboards shall be provided per the panel schedules on the drawings.
- N. Phase Loss Monitor (PLM)
  1. The MCC shall be provided with phase failure relays wired for shutdown of 3-phase motors. It shall monitor phase loss, unbalance, low voltage and reverse phasing, with automatic reset. Each phase fail relay shall have 2 Form C contacts (DPDT).
  2. PLM shall have undervoltage adjustment from 75-100%, response time delay set or adjustable between 3 and 5 seconds, phase unbalance set or adjustable between 5% and 10% and an LED indication for relay energized.
  3. Sufficient control relays and wiring shall be supplied to provide one shutdown contact for each Full Voltage motor control circuit and 2 additional spare contacts.
- O. Operating Mechanisms
  1. All circuit breakers in motor control centers shall be provided with external "thru-the-door" operating handles.

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. The Contractors shall verify that the motor starters, protection equipment, and other components, etc. provided are suitable (correct phase, voltage, starter type, correct breakers, and overload relays) for the motors and equipment loads being served.
- B. The motor control center shall be assembled per the Contractor's requirements, and shipped to the Contractor's shop. The Contractor shall complete the construction of the motor control center wiring and components per the contract documents. The motor control center shall be completely tested in the Contractor's shop and delivered to the site ready for external connections to field equipment.
- C. All assembly and wiring not completed by the manufacturer or Contractor due to

## **SECTION 16920 – MOTOR CONTROL CENTERS**

shipping sections, multiple suppliers, etc. shall be the responsibility of the Contractor.

- D. Nameplates shall be mounted in a manner or location such that other equipment or devices do not block them so they are easily viewed.

### **3.02 TESTING**

- A. The motor control center shall be tested in the Contractor's shop along with the control system. The testing shall include, but not be limited to, operation of all input and output (I/O) points, control devices and motor controllers.
- B. Testing and inspection of the motor control center shall include all components. All motor controllers shall be interconnected with the control system and powered with rated incoming voltage.

### **3.03 INSTALLATION**

- A. The motor control system shall be installed in accordance with the installation drawings and manufacturer's instructions. Installation shall be performed by workers who are skilled and experienced in the installation of motor control equipment.

### **3.04 WIRING**

- A. Refer to Section 16120 for acceptable wiring types and methods.
- B. All signal and low voltage wiring shall be separated from 120 volt and 480 volt AC wiring and shall maintain a minimum of 1 inch separation of conductors.

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

## **SECTION 16925 – INSTRUMENTATION AND CONTROL**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section covers and includes the general requirements for furnishing, installing, adjusting, testing, documenting, and startup of the complete and functional waste water pump control systems.
- B. Major components of this system include, but are not limited to, all materials, equipment, and work required to implement a complete and operating system as described herein. The system shall include a complete electrical enclosure with operator interface, instrumentation, pump starters and all hardware and software required to program, calibrate and monitor the control devices.
- C. An existing PLC controller with radio telemetry will be utilized for the automatic pump control and remote monitoring. One panel will require relocation in the pump building (PS#3 only). Contractor shall provide I/O expansion modules, operator interfaces, and network switches as indicated on the drawings. PLC, telemetry, and operator interface programming will be provided by the City's Programmer (L2 Systems), under force account.
- D. The Contractor shall provide, calibrate, set up and test the complete control system. The Contractor shall place the completed system in operation, including testing and making final adjustments to instruments and equipment as required during system start-up. The Contractor shall provide the services of trained and qualified instrument technicians for these services.

#### **1.2 RELATED SECTIONS**

- A. 16010 – Electrical General
- B. 16910 – Variable Frequency Drives
- C. 16920 – Motor Control Centers

#### **1.3 DEFINITION OF TERMS**

- A. Contractor: The party who furnishes and installs all tools, materials, and equipment to complete the work described in these specifications. This includes the General Contractor, the Electrical Contractor, Control System Integrator, City Programmer and all other Subcontractors.
- B. Electrical Contractor: The organization licensed in the State of Washington to provide the electrical wiring and installation, electrical permits and required inspections.

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- C. Control System Integrator (CSI): An organization engaged in the business of detailed design, component selection, procurement, fabrication, wiring, assembly and testing of process control systems.
- D. City Programmer: The pre-selected control system company subcontracted by the Contractor to develop and test the software applications for the PLC, SCADA and communications systems.

### 1.4 DIVISION AND ASSIGNMENT OF RESPONSIBILITY

- A. All materials and modifications to the existing control system shall be provided under the supervision of a single Contractor, which is regularly engaged in the design and installation of such systems of similar scope and complexity.
- B. The Contractor shall be fully and completely responsible for all work performed and all materials installed under the contract. The contract between the Contractor and subcontractor(s) shall conform to and meet all requirements specified in the contract documents.

- C. Electrical Contractor's Responsibility

The Electrical Contractor shall be responsible for the following control system equipment and services:

- 1. Installation of all control system equipment in accordance with these documents, and drawings provided by the Control System Integrator.
- 2. Provide all electrical permits and inspections as required by the State of Washington.
- 3. Provide electrical panel modifications, demolition of existing equipment, raceway and other equipment and installation as required.
- 4. Coordination with the City for equipment installation, special operational needs for the facility, and facility scheduling requirements.

- D. Control System Integrator Responsibilities

The Control System Integrator shall be responsible for the following equipment and services:

- 1. Provide detailed control system design.
- 2. Provide all PLC, operator interface, telecomm and related hardware.
- 3. Provide UL labeled Float Control Panel for each site, as shown on the drawings.
- 4. Provide Motor Control Center and Pump Control Panels, as shown on the

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drawings.

5. Coordinate with City Programmer to provide control system documentation and PLC hardware to allow shop testing of PLC code prior to field installation, if required.
6. Assist to commission, adjust, test and put the new equipment into operation.
7. Provide final documentation, training, as-built drawings and Operation and Maintenance manuals.

### **E. City Programmer Responsibilities**

The City Programmer (L2 Systems) shall be responsible for the following equipment and services:

1. Modify existing Telemetry Panel at each location to install the new operator interfaces, I/O cards, network switch furnished by the Control System Integrator and any other required panel modifications.
2. Provide PLC, operator interface, network and SCADA programming for pump station operation and remote monitoring.
3. Configure new communication over fiber optic network with radio telemetry backup at Pump Station 2.
4. Provide all PLC, OIU and SCADA software and licenses.
5. Coordinate with Control System Integrator for documentation.
6. Shop test all new program functionality prior to field installation.
7. Provide programming modifications to existing RSView SCADA system and alarm dialer application for tagname and addressing revisions for new PLC registers.
8. Attend system startup, testing and commissioning to fully test the new PLC, OIU and SCADA programs and functionality.

### **F. SPECIAL REQUIREMENTS**

1. The City Programmer shall be L2 Systems Inc., Lynnwood WA. Contact Mitch Stewart, 425.258.2402.
2. The Contractor shall provide all City Programmer services under the project Force Account, see Division 1.

### **G. APPROVED CONTROL SYSTEM INTEGRATORS**

1. The following Control System Integrators are listed on the Small Works Roster for the City of Ferndale, and are the only Control System

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Integrators approved for this project.

- a. Systems Interface Inc.
- b. Quality Controls Corporation (QCC)
- c. Process Solutions
- d. L2 Systems LLC
- e. Technical Systems, Inc. (TSI)

### **1.5 SUBMITTALS**

#### **A. Hardware Submittals**

#### **B. In addition to the requirements stated elsewhere in these documents, the following information shall be provided:**

1. Before any components are purchased, fabricated, and/or integrated into assemblies, or shipped to the site, the System Integrator shall prepare a complete hardware submittal.
2. Provide hard copies of submittal to the Engineer for review, including fully detailed shop drawings, catalog cuts, bill of materials, wiring connections, and such other documentation as may be required to fully describe the equipment and to demonstrate its conformity to these plans and specifications. Catalog information shall be submitted for all components and equipment required for the project.
3. All submittals shall be complete, organized, and indexed. Partial submittals will not be accepted.

#### **C. System Drawing Submittals**

1. Following approval of the Hardware Submittal, the System Integrator shall prepare complete system interconnect wiring diagrams and panel layout drawings for approval.

### **1.6 OPERATION AND MAINTENANCE MANUALS**

- A. Provide Operation and Maintenance (O&M) data for the complete control system and related equipment, in accordance with the general requirements in Section 16010.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. Material shall be new, free from defects, and of the quality specified. All



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equipment and materials utilized in the system shall be the products of manufacturers with at least five (5) years' experience in the manufacture of similar equipment. Similar items in the system shall be the products of the same manufacturer. All equipment shall be of industrial grade and shall be specifically intended for control and monitoring of operation of motor-driven pumps and equipment. All equipment shall be of modular design to facilitate interchangeability of parts and to assure ease of servicing.

### 2.2 CONTROL PANELS

#### A. Control Panels - General

1. Control panels shall be designed, assembled, tested and placed into operation by the System Integrator. The control panel shall fit into the space requirements as shown on the drawings. The contract drawings show general control panel layout and space requirements. Final dimensions shall be selected by the System Integrator to adequately install and wire the required control equipment. Detailed panel layout and interconnecting drawings shall be submitted prior to ordering of materials, and shall be subject to review and approval by the Engineer.
2. The enclosure sizes shall be selected by the System Integrator to provide adequate space and arrangement for all equipment shown on the drawings, and shall be submitted to the Engineer for approval.
3. Enclosures shall be manufactured by Hoffman, Hammond, or equal.

#### B. Motor Starters and Protective Equipment

1. Motor starters shall be Full Voltage Non Reversing (FVNR), where approved by the electrical Utility. In general, this includes all duplex pump stations at 480Y/277V three phase, 20 HP or less.
2. Soft Starters or Variable Frequency Drives (VFD's) shall be provided where the motor Horsepower rating exceeds the maximum starting size as allowed by the Utility.
3. VFD's shall be provided where level or flow control are required.
  - a. FVNR starters shall be provided as redundant bypass starters for VFD applications, where allowed by the Utility.
  - b. VFD's shall be Allen Bradley Powerflex series.
4. Seal Fail and Thermal Relays
  - a. Pump seal fail and thermal relays shall be installed for each pump in the system.
  - b. The relay shall be wired to a seal failure probe and thermal

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contacts in the pump housing, and shall be connected to the PLC for alarm notification.

- c. The relay shall be hard wired in the pump control circuit as required by the pump manufacturer to prevent equipment damage and maintain the pump warranty.
- d. Relays shall be Mini-CAS II, or manufacturer approved equal.

### 5. Circuit Breakers

- a. Circuit breakers shall be molded case thermal-magnetic type.
- b. Circuit breakers for service and motor disconnects shall be lockable per NEC.

## C. Control and Indication

### 1. Standard components:

- a. Control Power Transformers: Provide individual control power transformers (CPT's) for each pump starter circuit.
  - 1) 250VA, 480/120VAC with fuse clips and fusing on CPT's.
  - 2) Allen Bradley #1497-E-BASX-3.
- b. Voltage Monitor: ATC Diversified SLA series, Eaton D65VMLS series, or equal. Set time delay to 5 seconds.
- c. Surge protector: Allen Bradley 4983-DS series, or equal.
- d. General purpose receptacle: 15 amp, GFCI, DIN mount. Allen Bradley 1492-REC15G.
- e. Alarm Horn: NEMA 4X, Edwards 877 series for DC, 876 series for AC.
- f. Alarm Beacon: NEMA 4X, red LED, steady on. Edwards #125LED series, Allen Bradley 855PS series, or equal. Include vandal resistant cover.
- g. Selector switches including HOA switch: Allen Bradley 800H-JR series or equal.
- h. Pushbuttons: Allen Bradley 800H-AR series or equal.
- i. Indicator lights: LED, push to test, 30.5 mm. Allen Bradley 800HC-QRTH or equal.
- j. Ammeter – amps: CTs and 3 position switch to measure each phase. Grainger #12G series, or equal.
- k. Elapsed Time Meter: Combination run time meter (hours) and

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start counter. Eaton #CEC-55PM-406, or equal.

- l. Relays, general purpose: DPDT with indicators. Allen Bradley 700-HF series or equal.
  - m. Time delay relays: Allen Bradley 700-HR series, or equal.
  - n. Terminal blocks: Allen Bradley 1492-J series, or equal.
  - o. Additional components including branch circuit breakers, fusing, wiring, wireway, etc shall be provided as required.
2. Backup Float Control System
- a. A backup float control system shall be provided independent of the PLC control system, with the following requirements:
  - b. Dedicated 120VAC power circuit from the load center or upstream of the pump controls.
  - c. Float/PLC selector switch. Control shall automatically switch to the Float control on PLC failure.
  - d. Intrinsically safe relays and floats for Lead Start, Lag Stop and Pumps Stop level control.
  - e. Alternating relay to alternate lead pump each cycle. Eaton #D851NA or equal.

### D. Automatic Pump Control

The PLC control system shall provide the primary control of the pumps, with the following requirements:

1. Dedicated 120VAC power circuit from the load center or upstream of the pump controls.
2. DC power supply and DC UPS to backup PLC, alarm light and telemetry on power failure.
3. Float/PLC selector switch. A normally open (N.O.) PLC output shall be programmed to allow auto PLC control while in PLC mode. If the PLC faults, the system will be wired to automatically switch to Float control.
4. Intrinsically safe barrier and submersible level transducer for wet well level control. Setpoints configurable via local operator interface and remote SCADA system.
5. Intrinsically safe relays and floats for High and Low level control and alarms. PLC shall be programmed with to use the floats to back up the transducer control, and alarm on high or low level. De-bounce timers shall be programmed for all alarms.

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6. Lead/Lag control, alarms, pump protective features, and other PLC auto control shall be programmed by the City's programmer based on current standards.
7. Provide flow rate and totalization both on the local display and on the SCADA screens.

### E. OPERATING AND INDICATING DEVICES

Operating and indicating devices minimum rating shall be NEMA 13. Operator devices mounted in outdoor panels, corrosive areas or where exposed to moisture shall be NEMA 4X.

#### 1. Selector Switches

Selector switches shall be for use on 120 volt control circuits. Contacts shall have a continuous current rating of 10 amperes both inductive and resistive. Selector switches shall be of the heavy duty oil tight type. Allen Bradley, Bulletin 800T, 800H, or equal.

#### 2. Indicating Lights

Indicating lights shall be push-to-test oil tight type. Units shall have LED lamps and shall be of the illuminated pushbutton type with the pushbutton wired for the push-to-test function required. Appropriate LED and lens color shall be provided as shown. Allen Bradley, Bulletin 800T, 800H, or equal.

#### 3. Control Relays

Relays for general purpose use shall be DPDT, 5 ampere minimum contacts with the appropriate coil voltage for the application. They shall have an 8-pin base, matching socket, and contact status indicator. All relays shall include MOV snubbers (for AC) or diodes (for DC) applied across the relay coils to reduce the surge caused by coil breakdown transients. Relays shall be Idec RH2B-ULD, or equal.

#### 4. Terminal Blocks

Terminal blocks shall be 600 volt modular terminal blocks with tubular screw and pressure plate. Provide a minimum of 20% or four whichever is greater, spare terminals in each panel. Allen-Bradley #1492-CA1, or equal.

## 2.3 PROGRAMMABLE LOGIC CONTROLLER AND SUPPORT COMPONENTS

### A. Programmable Logic Controller

1. The programmable controller for each location will be an existing Allen Bradley ControlLogix PLC, and will be programmed by the City's

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programmer for the automatic pump control logic.

2. Provide new I/O modules where indicated. Install module and associated wiring and terminals in existing panel. Coordinate with programmer for installation.

### B. Operator interface:

1. The new operator interface unit at each location shall be a color touch panel with Ethernet communications and 24VDC powered.
2. Operator interface shall run Windows CE 6.0 operating system and shall provide for real time monitoring of the terminal displays from a web browser.
3. Provide all required cables and pre-loaded development software and licenses for a complete and operational system.
4. The new OIU shall be installed in the front door of the existing Telemetry panel.
5. Manufacturer: Allen-Bradley Panelview Plus 6 700, #2711-T7-C4-D8.

### C. Backup Float Control Panel

1. Provide a backup float control panel including enclosure, switches, indicators, relays etc for backup float control.
2. The float control panel shall be powered from a dedicated AC power circuit from the panelboard, separate from the Telemetry supply.

### D. Programming of PLC and Operator Interface

1. The PLC and operator interface shall be programmed by the City's programmer to provide the screens and functionality described in these specifications.
2. The System Integrator shall provide field technicians to assist with the startup and functional checkout of the complete control system.
3. Programming Software:
  - a. PLC and operator interface programming and programming software required for the project will be provided by the City's programmer.

### E. Circuit Breakers

1. Circuit breakers other than those mounted in the panelboard shall be capable of being padlocked in the open position.

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2. Thermal Magnetic: Circuit breakers shall be molded case thermal-magnetic type. Circuit breakers shall be quick-make and quick-break type. They shall have wiping type contacts. Each shall be provided with arc chutes, individual trip mechanisms on each pole. Two and three pole breakers shall be common trip. All breakers shall be calibrated for operation in an ambient temperature of 40oC. Molded case circuit breakers shall be trip-free. Each breaker shall have separate trip indication independent of the ON or OFF positions.

### F. Load Center

1. Panelboard(s) or load center(s) shall be provided for power distribution, where shown on the drawings.

## 2.4 INSTRUMENTATION

### A. FLOAT SWITCH

1. Replace all existing float switches at both locations. Wire to existing 'Intrinsically Safe Panels' and existing intrinsic safety barriers.
2. Switch shall be free floating, direct acting float switch designed for operation in raw sewage.
3. Mounting hardware shall include fixed installation on a 1" pipe, or suspended with a Kellems cord grip/strain relief and a weighted stainless steel support cable.
4. The float cable shall be a PVC coated multicore connecting cable which also contains the conductors, and shall be UL listed.
5. Float shall contain a Form-C switch with a minimum rating of 10 amps at 120 Volts resistive load, 5 amps at 30VDC.
6. Float shall be foam-filled, hermetically sealed and polypropylene coated.
7. Floats shall be supplied with cable of sufficient length to reach the junction box without splices.
8. Intermediate relays and intrinsic safety barriers shall be provided for all wet well instrumentation in accordance with NFPA 820 and NEC article 500
9. Level switches shall be Flygt model ENM-10 #5828821 with cable mounting kit and all required accessories, or equal.

### B. Submersible Level Transducer

1. Provide submersible level transducer wired to PLC for primary mode of pump station operation.

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2. PLC controller shall be configured for Lead Start, Lag Start, Pump Stop, High Level and Low Level alarms based on adjustable level setpoints.
3. The level sensor shall have an accuracy of  $\pm 0.25\%$ . The sensor housing and internal components shall be 316 SS.
4. The sensor shall include stainless steel mounting hardware including Kellums strain relief assembly, and all manufacturer recommended hardware for mounting in the wet well.
5. The sensor shall be FM approved for installation in Class 1, Div I Hazardous areas, and shall include an Intrinsic Safety Barrier in the Control Panel, and include a 2-wire 4-20ma output compatible with 9-32Vdc excitation.
6. Sensor shall be factory calibrated for 0-15 psi range, and include sufficient length of vented cable to route direct to the control panel without splices. The vent cable shall include a bellows which shall be secured to the back panel of the control panel.
7. Level Sensor shall be WIKA model LS-10. Part #50432427 with LevelGuard, 0-15 PSI, 4-20 mA, 40' cable.

### C. ELECTROMAGNETIC FLOW METER

1. Provide and install the magnetic flow meters as shown on the Contract Drawings and specified herein. The flow meters shall be complete with all necessary accessories and hardware for a complete and workable installation.
2. General: The magnetic flow meters shall be of the low frequency and short form coil design. The field principle of electromagnetic induction shall produce a positive DC pulsed signal directly and linearly proportional to the liquid flow rate. The metering tube shall be constructed of carbon steel with ANSI flanged end connections. Electrodes can either be protruding (bullet nose), but shall be of 316 stainless steel, Hastelloy®, or zirconium construction. The material of construction of the liner shall be TEFLON or PTFE. The meter shall secure its power from the signal converter. The systems shall have a power consumption of no more than 20 watts each. No electronics shall be mounted in the metering tube of the magnetic flow meter.
3. The signal converters shall be integral to the flow head. Signal converters shall provide a precisely adjusted direct current at a keyed pulse frequency of 15 Hz per second to the primary field coil. The signal converters shall convert the output signal from the flow meters into a 4-20 mA signal directly proportional to flow rate. The signal converters shall have automatic zero correction. The accuracy shall be  $\pm 0.5$  percent of the actual flow rate. The signal converters shall transmit an isolated analog 4-20 mA

## SECTION 16925 – INSTRUMENTATION AND CONTROL

D-C signal, directly proportional to flow and a totalizer contact for remote flow totalization. The signal converters shall be designed to operate from a 120 AC, 60 Hz, single phase, power source. The signal converters shall generate power for the magmeter.

4. The units shall be labeled and listed by a recognized electrical testing laboratory for the application, or Approved by the Washington State Department of Labor and Industries for installation on the Project.
5. Each meter system shall be wet-calibrated at the manufacturer's facility against the master system. A calibration certificate shall be furnished for each meter. Provide grounding rings with each flow meter. The flow meter shall be capable of accidental submergence to 30 feet for a period of 24 hours.
6. The system shall be FM approved for installation in Class 1, Div 2 Hazardous areas.
7. The magnetic flow meters and signal converters shall be Siemens MagFlo with the following minimum components:
  - a. Mag 5000 Transmitter, Remote Mount.
  - b. Mag 5100W Mag Flow Meter.
  - c. Standard Coil Cable.
  - d. Standard Electrode Cable.
  - e. Remote Mount Wall Bracket.
  - f. Submersible Kit.

### D. Intrinsic Safety Barriers

1. Provide intrinsic safety barriers for all instrumentation installed in Hazardous areas.
2. Discrete barriers shall be dual input with 2-relay output.
  - a. Turck #IM1-12EX-R for AC signals
  - b. Turck #IM1-22EX-R for DC signals
3. Analog barriers shall be single input for 4-20mA instrumentation.
  - a. Turck #IM33-11EX-HI/24VDC for analog signals

## 2.5 SPARE PARTS

- A. In addition to spare parts mentioned elsewhere in this section, the Contractor shall supply the following spare parts:
  1. 100% spare lamps of each type used for indicating lights.



## **SECTION 16925 – INSTRUMENTATION AND CONTROL**

2. One spare control relay of each type used, or 20% whichever is the greater number.
3. One spare lens of each color used for indicating lights.
4. Two spare fuses for each fuse provided under 10 amperes and one spare fuse for each fuse provided over 10 amperes.
5. 2 spare float switches for each type used.

### **PART 3 - EXECUTION**

#### **3.1 GENERAL**

- A. Install materials and equipment in a workman-like manner utilizing craftsmen skilled in the particular trade. Provide work which has a neat and finished appearance.
- B. Coordinate Instrumentation and Control work with the System Integrator, City, Contractor and work of other trades to avoid conflicts, errors, delays and unnecessary interference with system operations during construction.

#### **3.2 PROTECTION DURING CONSTRUCTION**

- A. The Contractor shall provide protection for materials and equipment against loss or damage and the effects of weather. Prior to installation, store items in an indoor, dry location. Provide heating in storage areas for items subject to corrosion under damp conditions. Specific storage requirements shall be in accordance with the manufacturer's recommendations.

#### **3.3 COORDINATION FOR AUTOMATIC CONTROL AND MONITORING**

- A. The System Integrator and Contractor shall coordinate with the City's programmer, L2 Systems, to verify all programming and functional testing for the PLC, operator interface, telemetry and control system, and place the complete system into operation.
- B. The automatic control and monitoring features and operational requirements shall be coordinated between the City, L2 Systems, System Integrator and Contractor.
- C. The System Integrator and Contractor shall provide all required work for a complete and functional control system. Field adjustments or additional features added during startup and commissioning shall be included in the bid price.

#### **3.4 INSTALLATION AND TESTING**

- A. General

## **SECTION 16925 – INSTRUMENTATION AND CONTROL**

1. Installation and testing procedures shall be as specified in this section.
2. The control system shall be installed in accordance with the installation drawings and instructions prepared by the Contractor.
3. Installation shall be performed by the workers who are skilled and experienced in the installation of electrical instrumentation and control systems.
4. Installation shall include all elements and components of the control system and all conduit and interconnecting wiring between all equipment.
5. Equipment shall be located so that it is readily accessible for operation and maintenance.

### **B. Coordination**

1. Due to the nature of the installation being performed on an operational facility, close coordination between the Contractor and the City is critical.
2. The Contractor shall determine the phasing requirements to most efficiently install the new PLC system or sub-systems in order to minimize facility disruptions and requirements for manual operations. A written installation schedule shall be prepared and submitted to the City and Engineer for approval.
3. No on-site installation or testing shall be performed without prior coordination and written notice to the City and Engineer.
4. Prior to the commencement of any on-site installation or testing activity, the Contractor shall provide a written document containing detailed step-by-step test procedures, complete with forms for the recording of test results, testing equipment used, and identification of the individual performing or witnessing the test.

### **C. Shop Testing (where applies)**

1. The complete PLC control system shall be tested by the Control System Integrator and City Programmer to the maximum extent possible, prior to installation.
2. The Control System Integrator shall assemble all PLC hardware including racks, power supplies and communications equipment and provide initial power up and hardware verification.
3. The assembled PLC system hardware shall be made available to the City Programmer to perform initial software testing. The Control System Integrator shall provide personnel and equipment in their shop as required by the City Programmer to support the required testing.
4. The initial testing of the control system shall include energizing each

## SECTION 16925 – INSTRUMENTATION AND CONTROL

discrete input and output and simulating each analog input and output using a loop simulator and calibrator.

5. All circuits shall be energized during initial testing. A test log shall be kept which documents the performance of each device, loop, and circuit in the system. Failures shall be noted in the test log and corrected prior to scheduling subsequent testing. Upon completion of initial factory testing, a paper copy test report shall be provided to the Engineer. The report shall contain at a minimum the test log, PLC I/O verification listing, and a listing of failures and corrective measures taken.
6. The City Programmer shall load all new PLC programs into the new PLC processors and pre-test to the maximum extent possible including all control, indication, alarming, monitoring, and communications functions of the new control system.
7. The Control System Integrator and City Programmer shall revise, modify, calibrate, and adjust the system as required during the shop testing period.
8. All deficiencies discovered shall be corrected by the Control System Integrator and City Programmer. Testing shall continue until the system is approved by the Engineer.

### D. Field Installation of PLC equipment.

1. Maintain and protect existing panel and field wiring during demolition of existing PLC equipment.
2. Installation shall be in accordance with the approved installation schedule.
3. For each panel in system, install new PLC rack and equipment on existing backpanel.
4. Provide wiring modifications to replace or extend existing wiring and signals to new PLC system and I/O cards.
5. Re-label all wiring per the installation drawings provided by the Control System Integrator.

### E. Calibration, Start-up, and Commissioning

1. Recalibration of Existing Instruments
  - a. All existing instrument calibration shall be verified by the Control System Integrator and City Programmer during initial commissioning.

### F. System Start-Up

1. The control system shall be put into operation by the Electrical Contractor,

## SECTION 16925 – INSTRUMENTATION AND CONTROL

Control System Integrator, and City Programmer.

2. Provide coordination with the City for equipment installation, special operational needs for the facility, and facility scheduling requirements.
3. Provide and configure radio communications from the pump station to the water plant SCADA system at each site. At pump station #2, coordinate with WAVE Broadband to establish communications over Ethernet to the Water plant, and configure as the primary communication mode. Configure to fail over to the radio system as backup if the primary mode fails.
4. The functionality of all aspects of the control system shall be verified. Communications equipment shall be configured, calibrated, tuned, and verified to be functioning properly. All communications paths, shall be verified to be functioning within industry and manufacturers standards of strength, loss, and year round reliability.
5. All aspects of the control system, including but not limited to all inputs, outputs, circuits, loops, annunciation and alarming functions, automatic control functions, and manual control functions shall be verified to be working correctly.
6. A test log shall be kept indicating the test results for all system components and functions. A report containing the test log, PLC I/O verification listing, communication test results, and a listing of all deficiencies found and the actions used to correct the deficiencies shall be provided.
7. All deficiencies shall be corrected and a copy of this report shall be provided to the City prior to scheduling of commissioning with the City and Engineer present.
8. The acceptability of the start-up test results and report shall be at the discretion of the City and Engineer.

### G. Commissioning

1. After the initial system start-up and testing is completed and approved, final commissioning shall be performed. The Contractor shall exercise all aspects of the system and correct deficiencies as they are found.
2. Commissioning shall include operation and verification of all components, features, and functions of the entire control and communication system.
3. The Contractor shall inform the City and Engineer of the start-up and commissioning schedule at least seven calendar days prior to the commencement of testing.
4. Commissioning shall be considered complete when the City and Engineer

## **SECTION 16925 – INSTRUMENTATION AND CONTROL**

has determined that all of the system requirements have been met.

5. During the commissioning phase, the Contractor shall revise, modify, and adjust the system to achieve the operation required, as determined by the City and Engineer.

### **H. SYSTEM MAINTENANCE AND WARRANTY**

1. The Contractor shall be solely and completely responsible for all maintenance of the control system from time of start-up to the date of substantial completion of all work under the contract.
2. The Contractor shall correct all deficiencies and defects and make any and all repairs, replacements, modifications, and adjustments as malfunctions or failures occur. The Contractor shall perform all such work required or considered to be required by the City to properly maintain the system.
3. The Contractor shall make any and all repairs, replacements, modifications and adjustments required to eliminate any and all defects in design, materials and workmanship which are disclosed within the one year guarantee period.
4. The Contractor shall anticipate that the City may delay acceptance of all work under the contract if, in the judgment of the City, malfunctions or failures in operation of the control system repeatedly occur after start-up. The Contractor shall not be entitled to an extension of time or to any claim for damages because of hindrances, delays or complications caused by or resulting from delay by the City in accepting the work because of malfunctions or failures in operation of the control system.

### **I. OPERATION AND MAINTENANCE TRAINING**

1. The Contractor shall conduct specifically organized training sessions to educate and train the City's personnel in the maintenance and operation of all aspects and components of the control system. Training shall include, but not be limited to, the following subjects:
  - a. Preventative maintenance procedures
  - b. Trouble-shooting procedures
  - c. Calibration procedures
  - d. Testing procedures
  - e. Components replacement procedures
  - f. System operation
2. The contractor shall provide a minimum of 24 hours of on-site instruction to City employees after start-up and commissioning of the system.

## **SECTION 16925 – INSTRUMENTATION AND CONTROL**

3. Instruction shall be provided at each unique location in the facility. The City shall decide on the allocation of the required training time.
4. The City shall be allowed to video tape all or any part of the training sessions. The Contractor shall prepare and assemble specific instruction materials for each training session and shall supply such materials to the City at least two (2) weeks prior to the time of the training.

### **J. OPERATION AND MAINTENANCE DATA**

1. The Contractor shall prepare and assemble five (5) sets of detailed operation and maintenance manuals in accordance with the project general requirements. These manuals shall be submitted two weeks prior to training. The manuals shall include, but not be limited to, the following:
  - a. Preventative maintenance procedures.
  - b. Trouble-shooting procedures.
  - c. Calibration procedures.
  - d. Testing procedures.
  - e. Components replacement procedures and replacement components list including supplier contact information for each component listed.
  - f. System operation.
  - g. Programming.
  - h. System schematics / shop drawings.
  - i. As-built CAD wiring diagrams of overall system
  - j. Catalog data and complete parts list for all equipment and control devices.
  - k. Listing of recommended spare parts.
  - l. Listing of recommended maintenance tools and equipment.
  - m. Program documentation printout with tag numbers and descriptive comments.
  - n. Backup program on USB or CD.

### **K. All drawings shall be provided on USB or CD.**

- a. Drawing files shall be in .pdf format.

END OF SECTION 16925

**APPENDIX A –  
CITY OF FERNDALE  
PURCHASE ORDER NO. 61424  
WHITNEY EQUIPMENT**







## CITY OF FERNDALE

2095 Main St., P.O. Box 936  
Ferndale, Washington 98248  
(360) 384-4302 Fax (360) 384-1163

*Whitney Equipment Company, Inc.*

VENDOR

ADDRESS

## PURCHASE ORDER

DATE

*6/3*

,20

*16*

61424

PLEASE ENTER OUR ORDER FOR THE FOLLOWING AND PLEASE NOTE P.O. # ON INVOICE

DESCRIPTION
<i>Quote # 2566 for Pump Stations</i>
<i>2 &amp; 3, in accordance with Section</i>
<i>111000 of attached Purchase Specs,</i>
<i>Warranty Information &amp; Quotation</i>
<i>dated 5/25/16</i>

FUND CODE	BARS #
<i>402000005594356322</i>	

\$ AMOUNT
<i>Pump Station 2:</i>
<i>\$ 77,400 -</i>
<i>Pump Station 3:</i>
<i>\$ 46,500 -</i>

ORDERED BY

*Jeff Kadder via email dated 6/3/16*

APPROVED BY

APPLICABLE TAX \$

TOTAL \$

All charged merchandise or products must be obtained with a signed, approved purchase order.

White - Vendor's Copy

Yellow - File Copy



# Whitney Equipment Company, Inc.

21222 30<sup>th</sup> Drive SE, Ste. 110

Bothell, WA 98021-7019

www.weci.com

800-255-2580

Quote #: 25666

Date: 5/25/16

To: City of Ferndale

Attn: Katy Radder

Phone: 360-384-4302

Email: [katyradder@cityofferndale.org](mailto:katyradder@cityofferndale.org)

From:

Whitney Equipment Company

Laura Haggard

Katy,

Here is the price for Lift Stations 2 & 3 per specification 11000 Wastewater Pumps and Equipment supplied by Wilson Engineers. I understand that the power at both lift stations is 460V, 3phase. The prices for the stations are as follows:

## Lift Station #2

ITEM	QTY.	PART #	DESCRIPTION	UNIT PRICE	TOTAL
1	3	NT-3153.095	Flygt NT-3153.095 Including: 20 HP FM-rated explosion proof motors Integral Stainless Steel Cooling Jacket 460volt, 3 phase submersible pumps 434 Hard Iron impellers and insert rings Fluid leak sensors (3)100ft power cables (2) 6" x 8" Elbows (1) 6" x 10" Elbow (3) T Stand Kits (3) 8" Ball Check Valves (3) Certified Performance Test Curves (3) Mini Cas Relays and Sockets (1) Hard Iron Impeller kit including insert ring (1) Basic Repair Kit (1) Days of Start up Freight to Ferndale, WA		
<b>TOTAL</b>					<b>\$77,400.00</b>

## Lift Station #3

ITEM	QTY.	PART #	DESCRIPTION	UNIT PRICE	TOTAL
1	3	NT-3127.095	Flygt NT-3127.095 Including: 7.5 HP FM-rated explosion proof motors 460volt, 3 phase submersible pumps 422 Hard iron impellers and insert rings Fluid leak sensors 50ft power cables (3) 6" x 8" Elbows with integrated T Stands		

(3) 8" Ball Check Valves  
(3) Certified Performance Test Curves  
(3) Mini Cas Relays and Sockets  
(1) Hard Iron Impeller kit including insert ring  
(1) Basic Repair Kit  
(1) Days of Start up  
Freight to Ferndale, WA

**TOTAL        \$46,500.00**

Please make ensuing purchase orders to: Whitney Equipment Company, Inc.

FOB: Factory, freight is included above  
Terms: Net 30 days on approved accounts

This quote is valid for 30 days.  
Lead Time: 10-12 weeks ARO

If you have any questions, please give me a call.

Thank you,

Laura Haggard  
CC: Sharon Adler, Inside Sales Manager

***A Commitment to Quality and Service***

WHITNEY EQUIPMENT CO., INC.  
BOTHELL, WA  
STANDARD CONDITIONS OF SALE

These are Whitney Equipment Co., Inc., the Seller, Standard Terms and Conditions and the basis of our offer, unless specifically altered in writing herein, and changes may affect the price.

ACCEPTANCE: THIS QUOTATION OR PROPOSAL IS NOT AN OFFER. BUYER MAY, WITHIN 30 DAYS, MAKE THIS PROPOSAL THE BASIS OF AN ORDER WHICH IS SUBJECT TO ACCEPTANCE OF THE SELLER AND THE ACCEPTANCE OF OUR SUPPLIERS TO FURNISH ALL OR PARTS OF THE ORDER.

TAXES: We do not include any Federal, State, City, County, or other sales, custom duties, or taxes such as sales, use, excise, retailer's occupation or similar taxes and fees, in the price and we will add any taxes that are required to pay to the purchase price. In lieu of paying such taxes to the Seller, the Buyer may furnish the Seller with a Tax Exemption Certificate or other legal and appropriate taxing authorities at any time.

TERMS: The Seller's terms are net cash 30 days after the date of the invoice. The Seller reserves the right to require payment in advance or C.O.D. and otherwise modify credit terms should the Buyer's credit standing not meet the Seller's acceptance. A service charge of 1.5% per month on the unpaid balance will be charged on all overdue monies payable. Buyer shall not assign or transfer their contract or any interest in it, or monies payable under it, without the written consent of Seller and any assignment made without such consent shall be null and void. Buyer agrees to pay all collection costs and costs of suit, including reasonable attorney fees, in the event Seller institutes collection action for overdue account. Seller expressly reserves all available lien rights in connection with any transaction between the parties.

CREDIT: Required with each order is the necessary credit information including bank reference, bonding company, or other necessary information with complete names, addresses, phone numbers, personal references, account and/or bond numbers.

SHIPMENTS: Delivery and shipping times are our best estimate and do not include time to transfer the products on order, and to accept order. We are not liable for delay that is beyond our control or caused by: an accident; riots; insurrections; national emergency; labor disputes of every kind however caused; embargoes; non-delivery by suppliers; delays of carriers or postal authorities; or governmental restrictions, prohibitions, or requirements. Regardless of the cause, we will not accept any penalty for shipping beyond the date specified in the contract.

APPROVALS: Buyer is responsible for obtaining engineers or owners approval on products. The Seller in this proposal represents only that products are as described. The Seller does not warrant that the products described will meet engineers or owners approval, or that products meet specification.

OCCUPATIONAL SAFETY AND HEALTH ACT of 1970 - We do not warrant or represent that any of our products by themselves or in a system or with other equipment will conform to or comply with the provisions of the Occupational Safety and Health Act of 1970 and the standards and regulations issued thereunder, or any other federal, state, or local law or regulation of the same or similar nature.

LIABILITY: Notwithstanding any liabilities or responsibilities assumed by Seller hereunder, Seller shall in no event be liable for lost profit, downtime, operating or maintenance costs or for any other special, indirect or consequential damages.

CANCELLATION: The Buyer may cancel his order only upon written notice and payment to Seller of reasonable cancellation charges specified by Seller.

INSURANCE: Buyer shall provide and maintain for Seller's benefit, insurance on said equipment against loss from fire, wind, water or other causes with insurance companies legally authorized to do business where said equipment is located in an amount at least equal to the value of said equipment until the equipment is accepted and paid for in full. In no case does the purchase price, even if inclusive of freight, cover the cost of insurance beyond the point of delivery specified in this Proposal.

WARRANTY: Whitney Equipment Company, Inc. makes no warranties on any products sold, provided however that the buyer shall have whatever warranty, if any, made by the manufacturer of the products sold. Whitney Equipment Co., Inc. expressly excludes from any warranty any and all charges, labor or otherwise, for installation, removal, reinstallation, shipping, utilities, equipment rental, other required materials, or any other items. The parties agree that the buyer's sole and exclusive remedy, if any, against the Seller shall be against the manufacturer as provided herein. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, down time, operating or maintenance costs, injury to persons or property, or any other special, indirect, incidental or consequential loss) shall be available to buyer.

THE WARRANTY AND THE LIMITATION OF REMEDIES SET FORTH HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND REMEDIES. WHITNEY EQUIPMENT CO., INC. MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE.

MERGER CLAUSE: The Seller's salesman may have made oral statements about the merchandise described in this contract. Such statements do not constitute warranties, shall not be relied on by the buyer, and are not part of the contract for sale. The entire contract is embodied in this writing. This writing constitutes the final expression of the parties' agreement, and it is a complete and exclusive statement of the terms of that agreement.

PRICE: The prices specified are in U.S. currency, payable free of all expense to the Seller for collection charges. Prorated payment shall be made for partial shipments.

CHANGES: We reserve the right to make changes and to substitute other material as needed to make shipment and fulfill the contract.

ERRORS: Seller reserves the right to correct clerical or stenographic errors or omissions.

GOVERNING LAWS: The terms of this agreement and all rights and obligations hereunder shall be governed by the laws of the State of Seller's office to which this order has been submitted.

INSPECTION: Buyer shall inspect Seller's Products upon receipt, and if Buyer's inspection reveals any defects in the Products, Buyer shall notify the Seller within three (3) days after receipt of the Products of any claim Buyer might have concerning such defects in the Products discovered by Buyer. Buyer's failure to notify Seller within such a three (3) day period shall constitute a waiver by Buyer of all claims covering such defects in the Products.

NOT INCLUDED: We do not include any item not specifically listed as included and specifically do not include freight, haulage, unloading, freight claims, installation, erection, concrete, grout, water, utilities, lubricating grease and oil, power, tools, labor, controls, conduit, wiring, meters, main disconnects, piping,

valves, fittings, gaskets, hardware, freight, taxes, covers, field paint, insurance, testing, royalties, maintenance, operation, erection supervision, transportation, anchor bolts, welding rod.

**FREIGHT:** Prices quoted are F.O.B. point of manufacture and do not include freight unless specifically listed as included. Title passed to the Buyer when the Products are transferred to the carrier and all freight claims are the responsibility of the Buyer. We will attempt to follow your shipping instructions, but are not responsible for actions and delays of the carrier or alter-carriers.

**BACKCHARGES** will not be accepted unless approved by Seller, in writing, before any work is done.

**DELAYS:** Price and terms and conditions are subject to revision if manufacture is not released at time of order placement or drawings for approval are not returned within 30 days from receipt by customer, or manufacture is released and subsequently held or delayed by the customer for more than 30 days, or customer requests longer than quoted shipment.

**DECOMPOSITION AND WEAR:** Decomposition by chemical action and wear caused by the presence of abrasive materials shall not constitute defects.

## SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT PURCHASE SPECIFICATION

### PART 1. GENERAL

#### 1.01 DESCRIPTION

- A. Supply complete, tested and operating, wastewater pumps and pump accessories as specified herein.
- B. Provide submittals; installation support; coordination with the general contractor, the control system manufacturer, and the control system integrator; start-up services; warranties; spare parts; operation and maintenance manuals; testing records; and any other services required to assist the contractor in providing a complete working installation.
- C. ***Note items in bold which are specifically excluded from the pre-purchase scope. These items shall be provided by the Contractor. Contractor is responsible for all labor and materials required to install the pre-purchased pump equipment to provide a complete pump system.***

#### 1.02 SUBMITTALS

- A. The Supplier shall provide submittals which include the following specific information shall be provided:
  - 1. Manufacturer's certified pump curves.
  - 2. Shop Drawing of complete pumping assembly including intake and discharge elbows and mounting frames, (if applicable)
  - 3. Catalog information and cuts.
  - 4. Manufacturer's specifications and equipment drawings.
  - 5. Manufacturer's parts lists, schematic and wiring diagrams.
  - 6. Complete lubrication, maintenance, and operation instructions.
  - 7. ***Control panel submittals including wiring diagram and panel layout.(NOT INCLUDED IN PREPURCHASE SPECIFICATION SCOPE – PANELS & PANEL SUBMITTALS TO BE PROVIDED BY GENERAL CONTRACTOR DURING CONSTRUCTION)***
  - 8. Interconnection wiring showing field wiring.
  - 9. Copy of manufacturer's warranty for pump.
- B. Affidavits: The Supplier shall furnish affidavits from the manufacturer stating that the pumps have been properly installed and tested, and each is ready for full time operation.
- C. Performance Testing: Copies of this factory testing shall be submitted to the Engineer for review and approval PRIOR TO SHIPMENT OF THE PUMPS.

#### 1.03 QUALITY ASSURANCE

- A. Field Tests. The pumping units shall be field tested after installation to demonstrate satisfactory operation, without causing excessive noise, vibration, cavitation, or overheating. The field testing shall be performed in the presence of an experience field representative of the manufacturer who shall supervise the startup and checkout of the equipment and who shall certify in writing that the pumps and motors have been properly

## SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT PURCHASE SPECIFICATION

installed, lubricated, adjusted, and prepared for operation.

- B. Performance Testing: Certified non-witnessed factory performance tests in accordance with Hydraulics Institute Standards are required for each pump. Copies of this factory testing shall be submitted to the Engineer for review and approval PRIOR TO SHIPMENT OF THE PUMPS

### 1.04 WARRANTY

- A. In addition to 1 year warranty from date of substantial completion, provide the pump manufacturers guarantee in printed form and previously published as the manufacturer's standard warranty for all similar units manufactured. The prorated guarantee shall cover the pumps against defects in workmanship and material for a minimum of five (5) years or 10,000 hours of operation under normal use and service.

## PART 2. PRODUCTS

### 2.01 PUMP STATIONS - GENERAL

- A. The supplier shall be locally available for onsite response when called within a reasonable time, depending upon the nature of the emergency. The Supplier shall have personnel available 24 hours a day, every day of the year – NO EXCEPTIONS.
- B. The pumps shall be supplied with a 1-year clog-free guarantee from the manufacturer.

### 2.02 WASTEWATER PUMPS

- A. General: Submersible wastewater pumps shall be heavy-duty, submersible, non-clog, centrifugal, quick disconnect sump pumps. The pumps shall be capable of operating in the range of capacity specified on a continuous basis with no detrimental effects to the pump or motor.
- B. Pump Schedule: The pump operating characteristics shall be as follows.

1. Pump Station No. 2 - (three pumps)

a. Service Conditions (gpm @ TDH)

Service Conditions	Q/TDH Minimum	Q/TDH Maximum
1-Pump Operating	1583gpm @ 28.0-FT	1952gpm @ 16.0-FT
2-Pump Operating	2732gpm @ 36.2-FT	2911gpm @ 33.0-FT
3-Pump Operating	3184gpm @ 46.8-FT	3726gpm @ 40.6-FT

- b. Minimum Shutoff Head 84 feet ± 1 ft
- c. Rated Speed 1755 rpm
- d. Pump Drive Type variable speed
- e. Nominal Motor Horsepower Size 20 HP
- f. Manufacturer & Type
- (i) Pump Flygt NT3153 MT 3~434,
- (ii) Motor Flygt NT3153.095 21-18-4AA-W



## SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT PURCHASE SPECIFICATION

2. Pump Station No. 3 – (three pumps)

a. Service Conditions (gpm @ TDH)

Service Conditions	Q/TDH Minimum	Q/TDH Maximum
1-Pump Operating	986gpm @ 20.0-FT	1159gpm @ 13.1-FT
2-Pump Operating	1722gpm @ 24.3-FT	1923gpm @ 20.8-FT
3-Pump Operating	1993gpm @ 30.5-FT	2333gpm @ 27.1-FT

- b. Minimum Shutoff Head 52.5 feet ± 1 ft
- c. Maximum Synchronous Speed 1720 rpm
- d. Pump Drive Type variable speed
- e. Nominal Motor Horsepower Size 10 HP
- f. Rated Motor Horsepower Size 7.5 HP
- g. Manufacturer & Type
  - (i) Pump Flygt NT3127 LT 3~422,
  - (ii) Motor Flygt NT3127.095 21-12-4AL-W

C. Pump Construction:

1. General

2. Fittings, Valves, and Appurtenances:

a. Pump Station No. 2

- (i) Intake Elbow – two each Flygt 8"x6" long radius elbows, one each 10"x 6" long radius elbow.
- (ii) T Stand Kits – Includes mounting base plate, mounting ring, and fasteners to connect the mounting base plate to the pump. ***Bolts, nuts, and gasket sets to connect the intake elbow to the pump and anchor bolts for pump mounting to the concrete pump base are not included in the pre-purchase scope.***
- (iii) Ball Check Valve – 8-inch Flygt Type 5087 Ball Check Valve, sinking type, 3 each.

b. Pump Station No. 3

- (i) Integral Intake Elbow & Pump Support Base – Flygt 8"x6" with integrated T stand, 3 each. ***Bolts, nuts, and gasket sets to connect the intake elbow to the pump and anchor bolts for floor mounting of pumps are not included in the pre-purchase scope.***
- (ii) Ball Check Valve – 8-inch Flygt Type 5087 Ball Check Valve, sinking type, 3 each.

3. Pump Castings: Castings shall be of cast iron or semi-steel of uniform quality and free from blowholes, porosity, hard spots, shrinkage defects, cracks and other

## SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT PURCHASE SPECIFICATION

injurious defects. The casings shall be designed to permit replacement of wearing parts. Joints shall be properly sealed with O rings and shall not leak under a test pressure equal to 50 percent greater than the pump discharge pressure or the total dynamic head, whichever is greater. Passageways shall permit smooth flow and shall be free from sharp turns and projections.

4. Impellers: Impellers shall be of hard iron (high chrome alloy) suitable for the service required. The impellers shall be smooth and free flowing and shall have sufficient clearance to permit objects in the sewage that enter the pump to pass into the discharge pipe. Each impeller shall be accurately fitted on the shaft, and locked in such a manner that lateral movement will be prevented and reverse rotation will not cause loosening.
5. Balance: All rotating parts of the equipment shall be in such balance, mechanically and hydraulically, as to operate throughout the required range without excessive end thrust, vibration or noise.
6. Shafts: Shafts shall be stainless steel, shall be of sufficient size and strength to perform the work required, and shall be adequately provided with alignment bearings.
7. Bearings: Bearings subject to submersion shall be ball bearings manufactured from high-grade bearing alloy. Bearing shall have a minimum B 10 life of 50,000 hours.
8. Mechanical Seals: Each pump shall be equipped with tungsten carbide seals.
9. Electrical Motors: The pump motor shall be induction type with a squirrel cage rotor, housed in an air filled, watertight chamber, NEMA B type. The stator windings and stator leads shall be insulated with moisture resistant Class H insulation rated for 356 °F. The motor shall have a minimum service factor of 1.15. Power cords shall be non-potted and removable. Stator windings shall be trickle impregnated with resin and rated at 180°C (355°F). Stator windings shall be embedded with three (3) thermal switches for overheating protection. The motor shall have integral moisture sensors that shall be monitored by a motor saver relay. The stator shall be heat-shrink fitted into the housing and locked against rotation. Motor speed, power specifications, and cord length shall be as follows:
  - a. Pump Station No. 2 - Submersible, 1755 rpm, 20 HP, 460 Volt, 3 phase, 60 Hertz. Each pump motor shall be equipped with a 100-ft combined power and signal cord.
  - b. Pump Station No. 3 – Submersible, 1720 rpm, 7.5 HP, 460 Volt, 3 phase, 60 Hertz. Each pump motor shall be equipped with a 50-ft combined power and signal cord.
10. Motor Saver Relay: The pumps shall be pre-wired for connection to Xylem Flygt MiniCAS – 120 motor saver relay. Contractor shall supply Xylem Flygt MiniCAS – 120 to Control Systems Integrator.
11. ***Miscellaneous Metals: Bolts, nuts, anchors, washers, and all other types of supports necessary for the installation of the pumps and drive units shall be furnished and shall be of Type 304 stainless steel. Not included in pre-purchase scope.***

## **SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT PURCHASE SPECIFICATION**

12. Shop Painting: Pump, motor, and accessories shall be factory applied and finish painted in accordance with the manufacturer's standard.
  - D. Pumps must be capable of operating within pump manufacturer's recommended operating envelopes through the full range of design flows and speeds. Any restrictions shall be incorporated into the pump control logic to prevent undesirable operating conditions from occurring at no additional cost to the OWNER.
- 2.03 SPARE PARTS
- A. Each pump station shall be furnished with the following spare parts, plus any additional spare parts listed as recommended by the manufacturer:
    1. Impeller and insert ring for each pump type.

### **PART 3. EXECUTION**

#### **3.01 DELIVERY**

- A. Delivery of all equipment shall be to the Contractor engaged by the City to construct the Pump Station Nos. 2 and 3 improvements. The equipment shall be delivered to a receiving area to be designated by the Contractor. Receipt of the equipment by the contractor shall be done in the presence of representatives from the Contractor, the Owner, the Engineer, and the Supplier. At the time of delivery, all equipment shall be tabulated and inspected. Once it is confirmed that all of the equipment covered by this specification is present and all parties agree that said equipment is undamaged, the Contractor shall take possession of the equipment by executing an record of equipment transfer form. The Contractor shall be responsible for installation and field testing of the pump equipment outlined in this specification section. The Contractor shall supply all labor, equipment, and materials not outlined in this section, but which is necessary to the construction of a complete pumping system at each station.

#### **3.02 INSTALLATION COORDINATION SERVICES**

- A. The supplier shall provide all installation coordination services required during construction.

#### **3.03 START-UP SERVICES**

- A. The pump equipment manufacturer shall furnish the services of a qualified factory trained field service engineer for a minimum of three (3) non-sequential 8-hour days (travel time excluded) to inspect the installations and instruct the Owner's personnel on the operation and maintenance of the pumps. After the pumps have been completely installed and wired, the Contractor shall have the pump manufacturer's field engineer perform the following
  1. Inspect megger stator and power cables.
  2. Check seal lubrication.
  3. Check proper rotation.
  4. Check power supply voltage.
  5. Measure motor operating load and no load current.
  6. Check level control operation sequence.

**SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT  
PURCHASE SPECIFICATION**

7. Perform flow tests to confirm pump's ability to meet the specified design flow conditions.
- B. The Contractor will be required to provide any additional information needed by the pump supplier to validate pump warranties (i.e. voltage and amp readings for each leg of line).

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

**SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT  
PURCHASE SPECIFICATION**

**RECORD OF EQUIPMENT TRANSFER**

**Project:** City of Ferndale  
**City Project No.** SS2014-02  
**Project Name:** Pump Station Nos. 2 & 3 Rebuild

**Transfer From:** Whitney Equipment Company, Inc.  
21222 30th Dr. SE #110  
Bothell, WA 98021

**Transfer To:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Equipment Transferred:** (Attach Bill of Materials, Bill of Lading, etc)

**Pump Station No. 2**

\_\_\_\_\_ each – Flygt NT3153 Wastewater Pumps & Accessories (including)

- Flygt NT3153 MT 3~434 Pump
- Flygt NT3153.095 21-18-4AA-W Motor
- 100-ft Power/Signal Cables
- 6"x8" Intake Elbow (for 2 of the pumps)
- 6"x10" Intake Elbow (for 1 of the pumps)
- T Stand Kits - Mounting Plate, ring, & connectors for pump mounting
- 8" Flygt Type 5087 Ball Check Valve
- Xylem Flygt MiniCAS – 120 motor saver relays and sockets
- Spare Parts per Purchase Order Specification

**Pump Station No. 3**

\_\_\_\_\_ each – Flygt NT3127 Wastewater Pumps & Accessories (including)

- Flygt NT3127 LT 3~422 Pump
- Flygt NT3127.095 21-12-4AL-W Motor
- 50-ft Power/Signal Cables
- 6"x8" Integral Intake Elbow w/ Integrated T Stand
- 8" Flygt Type 5087 Ball Check Valve
- Xylem Flygt MiniCAS – 120 motor saver relays and sockets
- Spare Parts per Purchase Order Specification

**SECTION 11100 – WASTEWATER PUMPS & EQUIPMENT  
PURCHASE SPECIFICATION**

**ACCEPTANCE OF EQUIPMENT:**

The Contractor acknowledges that he has inspected the subject equipment and deemed the equipment to be complete and undamaged. The Contractor hereby agrees that, by signing this record of transfer, the Contractor becomes solely responsible for all costs incurred from this point forward until final acceptance of the project by the City of Ferndale;

- to repair any damage that may occur to said equipment while in the Contractor's care, and
- to replace any of said equipment which may be lost or stolen while in the Contractor's care.

\_\_\_\_\_ hereby accepts the above referenced equipment on this  
\_\_\_\_\_ day of \_\_\_\_\_, 2016.

\_\_\_\_\_  
By:\_\_\_\_\_

Title:\_\_\_\_\_

**WITNESSES:**

\_\_\_\_\_  
By:\_\_\_\_\_

Title:\_\_\_\_\_

\_\_\_\_\_  
By:\_\_\_\_\_

Title:\_\_\_\_\_



# WARRANTY

## Xylem Water Solutions USA, Inc.

### DISCLAIMERS:

(i) Xylem Water Solutions USA, Inc.'s warranties are null and void when Flygt Products are exported outside of the United States of America without the knowledge and written consent of Xylem Water Solutions USA, Inc.; (ii) Xylem Water Solutions USA, Inc. makes no independent warranty or representation with respect to parts or products manufactured by others and provided by Xylem Water Solutions USA, Inc. (however, Xylem Water Solutions USA, Inc. will extend to the Purchaser any warranty received from Xylem Water Solutions USA, Inc.'s supplier for such parts or products).

### LIMITATIONS:

XYLEM WATER SOLUTIONS USA, INC. NEITHER ASSUMES, NOR AUTHORIZES ANY PERSON OR COMPANY TO ASSUME FOR XYLEM WATER SOLUTIONS USA, INC., ANY OTHER OBLIGATION IN CONNECTION WITH THE SALE OF ITS FLYGT EQUIPMENT. ANY ENLARGEMENT OR MODIFICATION OF THIS WARRANTY BY A FLYGT PRODUCT DISTRIBUTOR, OR OTHER SELLING AGENT SHALL BECOME THE EXCLUSIVE RESPONSIBILITY OF SUCH ENTITY.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ANY AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, GUARANTEES, CONDITIONS OR TERMS OF WHATEVER NATURE RELATING TO FLYGT PRODUCT(S), INCLUDING AND WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH ARE HEREBY EXPRESSLY DISCLAIMED AND EXCLUDED. PURCHASER'S EXCLUSIVE REMEDY AND XYLEM WATER SOLUTIONS USA, INC.'S AGGREGATE LIABILITY FOR BREACH OF ANY OF THE FOREGOING WARRANTIES IS LIMITED TO REPAIRING OR REPLACING FLYGT PRODUCTS AND SHALL IN ALL CASES BE LIMITED TO THE AMOUNT PAID BY THE PURCHASER HEREUNDER. IN NO EVENT IS XYLEM WATER SOLUTIONS USA, INC. LIABLE FOR ANY OTHER FORM OF DAMAGES, WHETHER DIRECT, INDIRECT, LIQUIDATED, INCIDENTAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY OR SPECIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF USE, LOSS OF PROFIT, LOSS OF ANTICIPATED SAVINGS OR REVENUE, LOSS OF INCOME, LOSS OF BUSINESS, LOSS OF PRODUCTION, LOSS OF OPPORTUNITY OR LOSS OF REPUTATION.

XYLEM WATER SOLUTIONS USA, INC. WILL NOT BE HELD RESPONSIBLE FOR TRAVEL EXPENSES, RENTED EQUIPMENT, OUTSIDE CONTRACTOR'S FEES, OR ANY EXPENSES ASSOCIATED WITH A FLYGT PRODUCT REPAIR SHOP NOT AUTHORIZED BY XYLEM WATER SOLUTIONS USA, INC. U.S.A., INC. REIMBURSEMENT COSTS FOR CRANES AND/OR ANY SPECIAL EQUIPMENT USED IN CONJUNCTION FOR THE REMOVAL AND/OR REINSTALLATION OF ANY FLYGT EQUIPMENT IS NOT COVERED UNDER THIS WARRANTY.

ANY UNAUTHORIZED ALTERATIONS TO SUPPLIED FLYGT EQUIPMENT USED WITHOUT XYLEM WATER SOLUTIONS USA, INC. SUPPLIED FLYGT BRAND CABLE OR CONTROLS WILL NOT BE COVERED UNDER THIS WARRANTY, UNLESS IT CAN BE PROVEN SUCH ANCILLARY EQUIPMENT IS SUITABLE FOR THE PURPOSE AND EQUAL TO XYLEM WATER SOLUTIONS USA, INC. SUPPLIED FLYGT BRAND CABLES OR CONTROLS THAT WOULD ORIGINALLY HAVE BEEN SUPPLIED WITH THE TYPE OF EQUIPMENT IN USE.

### REQUIREMENTS:

A copy of Electrical System Schematics of the Control used (including a Control's Bill of Material) could be required to support a Warranty Claim when a non Flygt Brand Control is used. In addition, a written record, hereby known as "the log", will be associated with each unit serial number and must be maintained by the organization having product maintenance responsibility. The log must record each preventative maintenance activity and any repair activity during the life of the warranty or verification that a Xylem Water Solutions USA, Inc. authorized Service Contract for Flygt Products is in force and must be available for review and/or auditing. Failure to meet these conditions could render this warrant null and void. Such logs could be required to determine warranty coverage.





# WARRANTY

## Xylem Water Solutions USA, Inc.

### STORAGE:

Should a delay occur between ship date and the date of start-up, maintenance as outlined in Xylem Water Solutions USA, Inc.'s Care & Maintenance Manual for Flygt Products must be performed by the "CONTRACTOR" and/or "OWNER" during any such period of storage. Documentation providing proof and outlining what maintenance was performed must be provided to Xylem Water Solutions USA, Inc. or its Flygt Products representative within thirty (30) days of said maintenance, or the Xylem Water Solutions USA, Inc. warranty for Flygt Products could be considered void.

### CONTROLS:

Warranty coverage for permanently installed controls will start for the end purchaser on the date of shipment. This warranty does not apply to controls that have been damaged due to a defective and/or improper input power supply, improper electrical protection, accidental damage, improper or unauthorized installation and/or repair, unauthorized alteration, negligence, environmental corrosion or chemical attack, improper maintenance or storage of control, any act of God, an act of war, an act of terrorism or damage resulting from the use of accessory equipment not approved by Xylem Water Solutions USA, Inc.. Further, this warranty does not apply in the event an adjustment is found to correct the alleged defect.

Solid state devices will be covered for a period of one (1) year except in the Flygt Standard Control Panel (FSCP) where the solid state devices will be covered for the full warranty period of the control panel. Electrical control panels containing controllers, PLC's, drives, soft starts, and other computerized equipment will require Transient Voltage Surge Suppression (TVSS) protection in order to satisfy the requirements of this warranty. The protection equipment associated with the control must be kept in working condition during the life of the warranty. Auxiliary equipment supplied with the control (air-conditioners etc.) is limited by the respective original equipment manufacturer's warranty offered. Consumable items such as: light bulbs, fuses, and relays are covered under normal operating conditions. Electrical surges experienced during startups and/or during normal operating use of the control panel will cause the consumable items not to be covered under this warranty policy. Components not supplied by Xylem Water Solutions USA, Inc. will not be covered by this warranty.

### TOP (The Optimum Pump Station)

Xylem Water Solutions USA, Inc. will warrant the Flygt TOP pre-engineered fiberglass pump station components against defects in material and workmanship for a period of one (1) year from date of start-up or eighteen (18) months from date of shipment and is valid only to the original owner of the station. Warranty shall cover the cost of labor and materials required to correct any warrantable defect, excluding any removal and reinstallation costs, FOB Xylem Water Solutions USA, Inc.'s authorized warranty service location for Flygt's TOP.

Flygt Products contained within a TOP pre-engineered fiberglass pump station will carry the standard Xylem Water Solutions USA, Inc. warranty for Flygt products and/or accessories installed in the TOP pre-engineered fiberglass pump station.

All Flygt Product restrictions and/or limitations as outlined and described within the context of this warranty are germane to all sections of this Xylem Water Solutions USA, Inc. Warranty document.

Xylem Water Solutions USA, Inc.  
National Quality Assurance - US Corporate







# WARRANTY

## Xylem Water Solutions USA, Inc.

For the period defined, Xylem Water Solutions USA, Inc. offers a commercial warranty to the original End Purchaser against defects in workmanship and material on Flygt Products. Warranty covers Flygt parts and labor as outlined in **ADDENDUM – A.**

### COVERAGE:

Xylem Water Solutions USA, Inc. will pay the cost of parts and labor during the warranty period, provided that the Flygt product, with cable attached, is returned prepaid to a Xylem Water Solutions USA, Inc. Authorized Service Facility for Flygt Product repairs. Coverage for Flygt parts and labor will be provided for the period shown in **ADDENDUM - A.** The warranty period will begin from date of shipment or date of a valid Start-up (For permanently installed pumps only). In cases where the Start-up date is used as the beginning of the warranty on a permanently installed Flygt pump, a Start-up Report completed by an approved service technician from a Xylem Water Solutions USA, Inc. Authorized Service Facility for Flygt products must be received by the Xylem Water Solutions USA, Inc. Area Service Manager for Flygt Products within thirty (30) days of the initial onset of the unit placed into service. If not received, the beginning of the warranty coverage will default to the Flygt product ship date. A Start-up for a permanently installed Flygt pump must occur within one (1) year from the date of shipment from a Xylem Water Solutions USA, Inc. authorized facility for Flygt Products or warranty will automatically default to ship date as start of warranty. (See **STORAGE** section) When using the start-up date as the beginning of the warranty, a copy of the Start-up Report will be required to support any Warranty Claims. Warranty on Flygt Dewatering pumps will begin with ship date only. No other date on Flygt Dewatering pumps will be considered.

Xylem Water Solutions USA, Inc.'s sole obligation under this Warranty for Flygt Products shall be to replace, repair or grant credit for Flygt Products upon Xylem Water Solutions USA, Inc.'s exclusive determination that the Flygt Product does not conform to the above warranty. In the event that the Flygt product is replaced, warranty on the replacement product will be equal to the balance remaining on the original product or ninety (90) days, which ever is greater.

### MISUSE:

This Warranty shall not apply to any Flygt product or part of Flygt product which (i) has been subjected to misuse, misapplication, accident, alteration, neglect, or physical damage (ii) has been installed, operated, used and/or maintained in a manner which is in an application that is contrary to Xylem Water Solutions USA, Inc.'s printed instructions as it pertains to installation, operation and maintenance of Flygt Products, including but without limitation to (iii) operation of equipment without being connected to monitoring devices supplied with specific products for protection; or (iv) damaged due to a defective power supply, improper electrical protection, faulty installation or repair, ordinary wear and tear, corrosion or chemical attack, an act of God, an act of war or by an act of terrorism; or (v) has been damaged resulting from the use of accessory equipment not sold by Xylem Water Solutions USA, Inc. or not approved by Xylem Water Solutions USA, Inc. in connection with Flygt products.

### WEAR PARTS:

This warranty does not cover costs for standard and/or scheduled maintenance performed, nor does it cover Flygt parts that, by virtue of their operation, require replacement through normal wear (aka: Wear Parts), unless a defect in material or workmanship can be determined by Xylem Water Solutions USA, Inc.. Wear Parts are defined as Cutters, Cutting Plates, Impellers, Agitators, Diffusers, Wear Rings (Stationary or Rotating), Volutes (when used in an abrasive environment), oil, grease, cooling fluids and/or any items deemed necessary to perform and meet the requirements of normal maintenance on all Flygt equipment.



## WARRANTY

### Xylem Water Solutions USA, Inc.

#### ADDENDUM – WARRANTY COVERAGE BY PRODUCT

ADDENDUM – WARRANTY COVERAGE BY PRODUCT						
PRODUCT	PRODUCT SERIES AND CONFIGURATION	Months	Months	Months	Months	Months
		1 - 12	13 - 18	19 - 36	37 - 39	40 - 60
Axial Flow/ Mixed Flow/ Centrifugal Pumps & Mixers	3000 Series (CP, NP, DP, CT, NT, CZ, LL) 4000 Series (SR, PP) 7000 Series (PL)	100%	100%	50%	50%	25%
Flygt Standard Control Panels (FSCP)	Standard Control Panels (FSCP – permanently installed)					
ETO Electrical Control Panels	Engineered to Order, Xylem Manufactured Control Panels (permanently installed) - 3 Years	100% - 1 YR	LIMITED - 2 - YR			
Abrasion/Corrosion Resistant & Chopper/ Grinder Pumps	3000 Series (MP, MF, MH, FS, FP, HP, HS) 5000 Series (HP, HS) 8000.280 Series (DP, DZ, DT, DS, DF)	100%	100% (From Ship Date)			
Dewatering Pumps	2000 Series (BS, KS) 3000 Series (CS, NS, DS) 8000.280 Series (DS, DF)	100% (From Ship Date)				
TOPS	Fiberglass Pump Station	100% (From Ship Date)	100% (From Ship Date)			
Accessories	Permanent / Portable	100% (From Ship Date)				
Hydro ejectors/ Aerators	HE, JA	100%				
Portable Pump Controls TOPS Control Panels	Control Boxes (Nolta, MSHA etc.) TOPS control panels (permanently installed)	100% (From Ship Date)				
Small Pumps	3045, 3057, SX	100% (From Ship Date)				
Parts - *	All new Flygt parts (mechanical & electrical)	100% (From Ship Date)				

\* - Parts that fail where used in a repair are warranted for one (1) year from the date of the repair for the failed part only – no labor; This Includes Flygt pump controllers, Flygt supervision equipment, Flygt submersible level transducers, etc.



**APPENDIX B –  
STATE PREVAILING WAGE RATES**





State of Washington  
Department of Labor & Industries  
Prevailing Wage Section - Telephone 360-902-5335  
PO Box 44540, Olympia, WA 98504-4540

### Washington State Prevailing Wage

The PREVAILING WAGES listed here include both the hourly wage rate and the hourly rate of fringe benefits. On public works projects, worker's wage and benefit rates must add to not less than this total. A brief description of overtime calculation requirements are provided on the Benefit Code Key.

#### Journey Level Prevailing Wage Rates for the Effective Date: 6/7/2016

<u>County</u>	<u>Trade</u>	<u>Job Classification</u>	<u>Wage</u>	<u>Holiday</u>	<u>Overtime</u>	<u>Note</u>
Whatcom	<a href="#">Asbestos Abatement Workers</a>	Journey Level	\$43.95	<u>5D</u>	<u>1H</u>	
Whatcom	<a href="#">Boilermakers</a>	Journey Level	\$44.35		<u>1</u>	
Whatcom	<a href="#">Brick Mason</a>	Journey Level	\$52.82	<u>5A</u>	<u>1M</u>	
Whatcom	<a href="#">Brick Mason</a>	Pointer-Caulker-Cleaner	\$52.82	<u>5A</u>	<u>1M</u>	
Whatcom	<a href="#">Building Service Employees</a>	Janitor	\$9.47		<u>1</u>	
Whatcom	<a href="#">Building Service Employees</a>	Shampooer	\$9.47		<u>1</u>	
Whatcom	<a href="#">Building Service Employees</a>	Waxer	\$9.47		<u>1</u>	
Whatcom	<a href="#">Building Service Employees</a>	Window Cleaner	\$9.47		<u>1</u>	
Whatcom	<a href="#">Cabinet Makers (In Shop)</a>	Journey Level	\$24.89		<u>1</u>	
Whatcom	<a href="#">Carpenters</a>	Acoustical Worker	\$54.02	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Carpenters</a>	Bridge, Dock And Wharf Carpenters	\$54.02	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Carpenters</a>	Carpenter	\$54.02	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Carpenters</a>	Carpenters on Stationary Tools	\$54.15	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Carpenters</a>	Creosoted Material	\$54.12	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Carpenters</a>	Floor Finisher	\$54.02	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Carpenters</a>	Floor Layer	\$54.02	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Carpenters</a>	Scaffold Erector	\$54.02	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Cement Masons</a>	Journey Level	\$53.95	<u>7A</u>	<u>1M</u>	
Whatcom	<a href="#">Divers &amp; Tenders</a>	Diver	\$107.22	<u>5D</u>	<u>4C</u>	<u>8A</u>
Whatcom	<a href="#">Divers &amp; Tenders</a>	Diver On Standby	\$64.42	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Divers &amp; Tenders</a>	Diver Tender	\$58.33	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Divers &amp; Tenders</a>	Surface Rcv & Rov Operator	\$58.33	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Divers &amp; Tenders</a>	Surface Rcv & Rov Operator Tender	\$54.27	<u>5A</u>	<u>4C</u>	
Whatcom	<a href="#">Dredge Workers</a>	Assistant Engineer	\$56.44	<u>5D</u>	<u>3F</u>	
Whatcom	<a href="#">Dredge Workers</a>	Assistant Mate (Deckhand)	\$56.00	<u>5D</u>	<u>3F</u>	
Whatcom	<a href="#">Dredge Workers</a>	Boatmen	\$56.44	<u>5D</u>	<u>3F</u>	

Whatcom	<a href="#">Dredge Workers</a>	Engineer Welder	\$57.51	<u>5D</u>	<u>3F</u>	
Whatcom	<a href="#">Dredge Workers</a>	Leverman, Hydraulic	\$58.67	<u>5D</u>	<u>3F</u>	
Whatcom	<a href="#">Dredge Workers</a>	Mates	\$56.44	<u>5D</u>	<u>3F</u>	
Whatcom	<a href="#">Dredge Workers</a>	Oiler	\$56.00	<u>5D</u>	<u>3F</u>	
Whatcom	<a href="#">Drywall Applicator</a>	Journey Level	\$54.02	<u>5D</u>	<u>1H</u>	
Whatcom	<a href="#">Drywall Tapers</a>	Journey Level	\$29.63		<u>1</u>	
Whatcom	<a href="#">Electrical Fixture Maintenance Workers</a>	Journey Level	\$13.82		<u>1</u>	
Whatcom	<a href="#">Electricians - Inside</a>	Cable Splicer	\$63.94	<u>7H</u>	<u>1E</u>	
Whatcom	<a href="#">Electricians - Inside</a>	Construction Stock Person	\$31.71	<u>7H</u>	<u>1D</u>	
Whatcom	<a href="#">Electricians - Inside</a>	Journey Level	\$59.69	<u>7H</u>	<u>1E</u>	
Whatcom	<a href="#">Electricians - Motor Shop</a>	Craftsman	\$15.37		<u>1</u>	
Whatcom	<a href="#">Electricians - Motor Shop</a>	Journey Level	\$14.69		<u>1</u>	
Whatcom	<a href="#">Electricians - Powerline Construction</a>	Cable Splicer	\$74.92	<u>5A</u>	<u>4D</u>	
Whatcom	<a href="#">Electricians - Powerline Construction</a>	Certified Line Welder	\$65.71	<u>5A</u>	<u>4D</u>	
Whatcom	<a href="#">Electricians - Powerline Construction</a>	Groundperson	\$44.12	<u>5A</u>	<u>4D</u>	
Whatcom	<a href="#">Electricians - Powerline Construction</a>	Heavy Line Equipment Operator	\$65.71	<u>5A</u>	<u>4D</u>	
Whatcom	<a href="#">Electricians - Powerline Construction</a>	Journey Level Lineperson	\$65.71	<u>5A</u>	<u>4D</u>	
Whatcom	<a href="#">Electricians - Powerline Construction</a>	Line Equipment Operator	\$55.34	<u>5A</u>	<u>4D</u>	
Whatcom	<a href="#">Electricians - Powerline Construction</a>	Pole Sprayer	\$65.71	<u>5A</u>	<u>4D</u>	
Whatcom	<a href="#">Electricians - Powerline Construction</a>	Powderperson	\$49.16	<u>5A</u>	<u>4D</u>	
Whatcom	<a href="#">Electronic Technicians</a>	Journey Level	\$25.09		<u>1</u>	
Whatcom	<a href="#">Elevator Constructors</a>	Mechanic	\$85.45	<u>7D</u>	<u>4A</u>	
Whatcom	<a href="#">Elevator Constructors</a>	Mechanic In Charge	\$92.35	<u>7D</u>	<u>4A</u>	
Whatcom	<a href="#">Fabricated Precast Concrete Products</a>	Journey Level - In-Factory Work Only	\$13.67		<u>1</u>	
Whatcom	<a href="#">Fence Erectors</a>	Fence Erector	\$22.97		<u>1</u>	
Whatcom	<a href="#">Flaggers</a>	Journey Level	\$37.26	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Glaziers</a>	Journey Level	\$56.16	<u>7L</u>	<u>1Y</u>	
Whatcom	<a href="#">Heat &amp; Frost Insulators And Asbestos Workers</a>	Journeyman	\$63.18	<u>5J</u>	<u>1S</u>	
Whatcom	<a href="#">Heating Equipment Mechanics</a>	Journey Level	\$19.85		<u>1</u>	
Whatcom	<a href="#">Hod Carriers &amp; Mason Tenders</a>	Journey Level	\$45.32	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Industrial Power Vacuum Cleaner</a>	Journey Level	\$9.47		<u>1</u>	
Whatcom	<a href="#">Inland Boatmen</a>	Boat Operator	\$56.78	<u>5B</u>	<u>1K</u>	
Whatcom	<a href="#">Inland Boatmen</a>	Cook	\$53.30	<u>5B</u>	<u>1K</u>	
Whatcom	<a href="#">Inland Boatmen</a>	Deckhand	\$53.30	<u>5B</u>	<u>1K</u>	

Whatcom	<a href="#">Inland Boatmen</a>	Deckhand Engineer	\$54.32	<u>5B</u>	<u>1K</u>	
Whatcom	<a href="#">Inland Boatmen</a>	Launch Operator	\$55.57	<u>5B</u>	<u>1K</u>	
Whatcom	<a href="#">Inland Boatmen</a>	Mate	\$55.57	<u>5B</u>	<u>1K</u>	
Whatcom	<a href="#">Inspection/Cleaning/Sealing Of Sewer &amp; Water Systems By Remote Control</a>	Cleaner Operator, Foamer Operator	\$9.73		<u>1</u>	
Whatcom	<a href="#">Inspection/Cleaning/Sealing Of Sewer &amp; Water Systems By Remote Control</a>	Grout Truck Operator	\$11.48		<u>1</u>	
Whatcom	<a href="#">Inspection/Cleaning/Sealing Of Sewer &amp; Water Systems By Remote Control</a>	Head Operator	\$12.78		<u>1</u>	
Whatcom	<a href="#">Inspection/Cleaning/Sealing Of Sewer &amp; Water Systems By Remote Control</a>	Technician	\$9.47		<u>1</u>	
Whatcom	<a href="#">Inspection/Cleaning/Sealing Of Sewer &amp; Water Systems By Remote Control</a>	Tv Truck Operator	\$10.53		<u>1</u>	
Whatcom	<a href="#">Insulation Applicators</a>	Journey Level	\$54.02	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Ironworkers</a>	Journeyman	\$63.53	<u>7N</u>	<u>1O</u>	
Whatcom	<a href="#">Laborers</a>	Air, Gas Or Electric Vibrating Screed	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Airtrac Drill Operator	\$45.32	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Ballast Regular Machine	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Batch Weighman	\$37.26	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Brick Pavers	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Brush Cutter	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Brush Hog Feeder	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Burner	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Caisson Worker	\$45.32	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Carpenter Tender	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Caulker	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Cement Dumper-paving	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Cement Finisher Tender	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Change House Or Dry Shack	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Chipping Gun (under 30 Lbs.)	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Chipping Gun(30 Lbs. And Over)	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Choker Setter	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Chuck Tender	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Clary Power Spreader	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Clean-up Laborer	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Concrete Dumper/chute Operator	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Concrete Form Stripper	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Concrete Placement Crew	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Concrete Saw Operator/core	\$44.76	<u>7A</u>	<u>3I</u>	

		Driller				
Whatcom	<a href="#">Laborers</a>	Crusher Feeder	\$37.26	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Curing Laborer	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Demolition: Wrecking & Moving (incl. Charred Material)	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Ditch Digger	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Diver	\$45.32	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Drill Operator (hydraulic, diamond)	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Dry Stack Walls	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Dump Person	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Epoxy Technician	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Erosion Control Worker	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Faller & Bucker Chain Saw	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Fine Graders	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Firewatch	\$37.26	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Form Setter	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Gabian Basket Builders	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	General Laborer	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Grade Checker & Transit Person	\$45.32	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Grinders	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Grout Machine Tender	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Groutmen (pressure)including Post Tension Beams	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Guardrail Erector	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Hazardous Waste Worker (level A)	\$45.32	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Hazardous Waste Worker (level B)	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Hazardous Waste Worker (level C)	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	High Scaler	\$45.32	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Jackhammer	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Laserbeam Operator	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Maintenance Person	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Manhole Builder-mudman	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Material Yard Person	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Motorman-dinky Locomotive	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Nozzleman (concrete Pump, Green Cutter When Using Combination Of High Pressure Air & Water On Concrete & Rock, Sandblast, Gunit, Shotcrete, Water Bla	\$44.76	<u>7A</u>	<u>3I</u>	



Whatcom	<a href="#">Laborers</a>	Pavement Breaker	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Pilot Car	\$37.26	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Pipe Layer Lead	\$45.32	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Pipe Layer/tailor	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Pipe Pot Tender	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Pipe Reliner	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Pipe Wrapper	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Pot Tender	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Powderman	\$45.32	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Powderman's Helper	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Power Jacks	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Railroad Spike Puller - Power	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Raker - Asphalt	\$45.32	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Re-timberman	\$45.32	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Remote Equipment Operator	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Rigger/signal Person	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Rip Rap Person	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Rivet Buster	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Rodder	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Scaffold Erector	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Scale Person	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Sloper (over 20")	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Sloper Sprayer	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Spreader (concrete)	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Stake Hopper	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Stock Piler	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Tamper & Similar Electric, Air & Gas Operated Tools	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Tamper (multiple & Self-propelled)	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Timber Person - Sewer (lagger, Shorer & Cribber)	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Toolroom Person (at Jobsite)	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Topper	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Track Laborer	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Track Liner (power)	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Traffic Control Laborer	\$39.84	<u>7A</u>	<u>3I</u>	<u>8R</u>
Whatcom	<a href="#">Laborers</a>	Traffic Control Supervisor	\$39.84	<u>7A</u>	<u>3I</u>	<u>8R</u>
Whatcom	<a href="#">Laborers</a>	Truck Spotter	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Tugger Operator	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Tunnel Work-Compressed Air Worker 0-30 psi	\$74.29	<u>7A</u>	<u>3I</u>	<u>8Q</u>
Whatcom	<a href="#">Laborers</a>	Tunnel Work-Compressed Air Worker 30.01-44.00 psi	\$79.32	<u>7A</u>	<u>3I</u>	<u>8Q</u>
Whatcom	<a href="#">Laborers</a>	Tunnel Work-Compressed Air	\$83.00	<u>7A</u>	<u>3I</u>	<u>8Q</u>

		Worker 44.01-54.00 psi				
Whatcom	<a href="#">Laborers</a>	Tunnel Work-Compressed Air Worker 54.01-60.00 psi	\$88.70	<u>7A</u>	<u>3I</u>	<u>8Q</u>
Whatcom	<a href="#">Laborers</a>	Tunnel Work-Compressed Air Worker 60.01-64.00 psi	\$90.82	<u>7A</u>	<u>3I</u>	<u>8Q</u>
Whatcom	<a href="#">Laborers</a>	Tunnel Work-Compressed Air Worker 64.01-68.00 psi	\$95.92	<u>7A</u>	<u>3I</u>	<u>8Q</u>
Whatcom	<a href="#">Laborers</a>	Tunnel Work-Compressed Air Worker 68.01-70.00 psi	\$97.82	<u>7A</u>	<u>3I</u>	<u>8Q</u>
Whatcom	<a href="#">Laborers</a>	Tunnel Work-Compressed Air Worker 70.01-72.00 psi	\$99.82	<u>7A</u>	<u>3I</u>	<u>8Q</u>
Whatcom	<a href="#">Laborers</a>	Tunnel Work-Compressed Air Worker 72.01-74.00 psi	\$101.82	<u>7A</u>	<u>3I</u>	<u>8Q</u>
Whatcom	<a href="#">Laborers</a>	Tunnel Work-Guage and Lock Tender	\$45.42	<u>7A</u>	<u>3I</u>	<u>8Q</u>
Whatcom	<a href="#">Laborers</a>	Tunnel Work-Miner	\$45.42	<u>7A</u>	<u>3I</u>	<u>8Q</u>
Whatcom	<a href="#">Laborers</a>	Vibrator	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Vinyl Seamer	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Watchman	\$33.86	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Welder	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Well Point Laborer	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers</a>	Window Washer/cleaner	\$33.86	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers - Underground Sewer &amp; Water</a>	General Laborer & Topman	\$43.95	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Laborers - Underground Sewer &amp; Water</a>	Pipe Layer	\$44.76	<u>7A</u>	<u>3I</u>	
Whatcom	<a href="#">Landscape Construction</a>	Irrigation Or Lawn Sprinkler Installers	\$11.50		<u>1</u>	
Whatcom	<a href="#">Landscape Construction</a>	Landscape Equipment Operators Or Truck Drivers	\$11.50		<u>1</u>	
Whatcom	<a href="#">Landscape Construction</a>	Landscaping Or Planting Laborers	\$11.50		<u>1</u>	
Whatcom	<a href="#">Lathers</a>	Journey Level	\$54.02	<u>5D</u>	<u>1H</u>	
Whatcom	<a href="#">Marble Setters</a>	Journey Level	\$52.82	<u>5A</u>	<u>1M</u>	
Whatcom	<a href="#">Metal Fabrication (In Shop)</a>	Fitter	\$13.81		<u>1</u>	
Whatcom	<a href="#">Metal Fabrication (In Shop)</a>	Laborer	\$9.47		<u>1</u>	
Whatcom	<a href="#">Metal Fabrication (In Shop)</a>	Machine Operator	\$13.81		<u>1</u>	
Whatcom	<a href="#">Metal Fabrication (In Shop)</a>	Welder	\$13.81		<u>1</u>	
Whatcom	<a href="#">Millwright</a>	Journey Level	\$30.79		<u>1</u>	
Whatcom	<a href="#">Modular Buildings</a>	Journey Level	\$9.47		<u>1</u>	
Whatcom	<a href="#">Painters</a>	Journey Level	\$39.35	<u>6Z</u>	<u>2B</u>	
Whatcom	<a href="#">Pile Driver</a>	Journey Level	\$54.27	<u>5D</u>	<u>4C</u>	
Whatcom	<a href="#">Plasterers</a>	Journey Level	\$51.68	<u>7Q</u>	<u>1R</u>	
Whatcom	<a href="#">Playground &amp; Park Equipment Installers</a>	Journey Level	\$9.47		<u>1</u>	
Whatcom	<a href="#">Plumbers &amp; Pipefitters</a>	Journey Level	\$65.52	<u>5A</u>	<u>1G</u>	
Whatcom	<a href="#">Power Equipment Operators</a>	Asphalt Plant Operators	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>

Whatcom	<a href="#">Power Equipment Operators</a>	Assistant Engineer	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Barrier Machine (zipper)	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Batch Plant Operator, Concrete	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Bobcat	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Brokk - Remote Demolition Equipment	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Brooms	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Bump Cutter	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Cableways	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Chipper	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Compressor	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Concrete Pump: Truck Mount With Boom Attachment Over 42 M	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Concrete Finish Machine -laser Screed	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Concrete Pump - Mounted Or Trailer High Pressure Line Pump, Pump High Pressure.	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Concrete Pump: Truck Mount With Boom Attachment Up To 42m	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Conveyors	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Cranes Friction: 200 tons and over	\$58.67	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Cranes: 20 Tons Through 44 Tons With Attachments	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Cranes: 100 Tons Through 199 Tons, Or 150' Of Boom (Including Jib With Attachments)	\$57.51	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Cranes: 200 tons- 299 tons, or 250' of boom including jib with attachments	\$58.10	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Cranes: 300 tons and over or 300' of boom including jib with attachments	\$58.67	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Cranes: 45 Tons Through 99 Tons, Under 150' Of Boom (including Jib With Attachments)	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Cranes: A-frame - 10 Tons And Under	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Cranes: Friction cranes through 199 tons	\$58.10	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Cranes: Through 19 Tons With Attachments A-frame Over 10 Tons	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>

Whatcom	<a href="#">Power Equipment Operators</a>	Crusher	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Deck Engineer/deck Winches (power)	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Derricks, On Building Work	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Dozers D-9 & Under	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Drill Oilers: Auger Type, Truck Or Crane Mount	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Drilling Machine	\$57.51	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Elevator And Man-lift: Permanent And Shaft Type	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Finishing Machine, Bidwell And Gamaco & Similar Equipment	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Forklift: 3000 Lbs And Over With Attachments	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Forklifts: Under 3000 Lbs. With Attachments	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Grade Engineer: Using Blue Prints, Cut Sheets, Etc	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Gradechecker/stakeman	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Guardrail Punch	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Hard Tail End Dump Articulating Off- Road Equipment 45 Yards. & Over	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Hard Tail End Dump Articulating Off-road Equipment Under 45 Yards	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Horizontal/directional Drill Locator	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Horizontal/directional Drill Operator	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Hydralifts/boom Trucks Over 10 Tons	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Hydralifts/boom Trucks, 10 Tons And Under	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Loader, Overhead 8 Yards. & Over	\$57.51	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Loader, Overhead, 6 Yards. But Not Including 8 Yards	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Loaders, Overhead Under 6 Yards	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Loaders, Plant Feed	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Loaders: Elevating Type Belt	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Locomotives, All	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Material Transfer Device	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Mechanics, All (leadmen - \$0.50 Per Hour Over Mechanic)	\$57.51	<u>7A</u>	<u>3C</u>	<u>8P</u>

Whatcom	<a href="#">Power Equipment Operators</a>	Motor Patrol Graders	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Mucking Machine, Mole, Tunnel Drill, Boring, Road Header And/or Shield	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Oil Distributors, Blower Distribution & Mulch Seeding Operator	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Outside Hoists (elevators And Manlifts), Air Tuggers, strato	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Overhead, Bridge Type Crane: 20 Tons Through 44 Tons	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Overhead, Bridge Type: 100 Tons And Over	\$57.51	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Overhead, Bridge Type: 45 Tons Through 99 Tons	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Pavement Breaker	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Pile Driver (other Than Crane Mount)	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Plant Oiler - Asphalt, Crusher	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Posthole Digger, Mechanical	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Power Plant	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Pumps - Water	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Quad 9, Hd 41, D10 And Over	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Quick Tower - No Cab, Under 100 Feet In Height Based To Boom	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Remote Control Operator On Rubber Tired Earth Moving Equipment	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Rigger And Bellman	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Rigger/Signal Person, Bellman (Certified)	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Rollagon	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Roller, Other Than Plant Mix	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Roller, Plant Mix Or Multi-lift Materials	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Roto-mill, Roto-grinder	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Saws - Concrete	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Scraper, Self Propelled Under 45 Yards	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Scrapers - Concrete & Carry All	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Scrapers, Self-propelled: 45 Yards And Over	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Service Engineers - Equipment	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Shotcrete/gunite Equipment	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Shovel , Excavator, Backhoe, Tractors Under 15 Metric	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>

		Tons.				
Whatcom	<a href="#">Power Equipment Operators</a>	Shovel, Excavator, Backhoe: Over 30 Metric Tons To 50 Metric Tons	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Shovel, Excavator, Backhoes, Tractors: 15 To 30 Metric Tons	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Shovel, Excavator, Backhoes: Over 50 Metric Tons To 90 Metric Tons	\$57.51	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Shovel, Excavator, Backhoes: Over 90 Metric Tons	\$58.10	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Slipform Pavers	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Spreader, Topsider & Screedman	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Subgrader Trimmer	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Tower Bucket Elevators	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Tower Crane Up To 175' In Height Base To Boom	\$57.51	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Tower Crane: over 175' through 250' in height, base to boom	\$58.10	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Tower Cranes: over 250' in height from base to boom	\$58.67	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Transporters, All Track Or Truck Type	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Trenching Machines	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Truck Crane Oiler/driver - 100 Tons And Over	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Truck Crane Oiler/driver Under 100 Tons	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Truck Mount Portable Conveyor	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Welder	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Wheel Tractors, Farmall Type	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators</a>	Yo Yo Pay Dozer	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Asphalt Plant Operators	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Assistant Engineer	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Barrier Machine (zipper)	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Batch Plant Operator, Concrete	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Bobcat	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Brokk - Remote Demolition Equipment	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Brooms	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>



Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Bump Cutter	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Cableways	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Chipper	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Compressor	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Concrete Pump: Truck Mount With Boom Attachment Over 42 M	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Concrete Finish Machine -laser Screed	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Concrete Pump - Mounted Or Trailer High Pressure Line Pump, Pump High Pressure.	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Concrete Pump: Truck Mount With Boom Attachment Up To 42m	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Conveyors	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Cranes Friction: 200 tons and over	\$58.67	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Cranes: 20 Tons Through 44 Tons With Attachments	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Cranes: 100 Tons Through 199 Tons, Or 150' Of Boom (Including Jib With Attachments)	\$57.51	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Cranes: 200 tons- 299 tons, or 250' of boom including jib with attachments	\$58.10	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Cranes: 300 tons and over or 300' of boom including jib with attachments	\$58.67	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Cranes: 45 Tons Through 99 Tons, Under 150' Of Boom (including Jib With Attachments)	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Cranes: A-frame - 10 Tons And Under	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Cranes: Friction cranes through 199 tons	\$58.10	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Cranes: Through 19 Tons With Attachments A-frame Over 10 Tons	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Crusher	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Deck Engineer/deck Winches (power)	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>

Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Derricks, On Building Work	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Dozers D-9 & Under	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Drill Oilers: Auger Type, Truck Or Crane Mount	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Drilling Machine	\$57.51	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Elevator And Man-lift: Permanent And Shaft Type	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Finishing Machine, Bidwell And Gamaco & Similar Equipment	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Forklift: 3000 Lbs And Over With Attachments	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Forklifts: Under 3000 Lbs. With Attachments	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Grade Engineer: Using Blue Prints, Cut Sheets, Etc	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Gradechecker/stakeman	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Guardrail Punch	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Hard Tail End Dump Articulating Off- Road Equipment 45 Yards. & Over	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Hard Tail End Dump Articulating Off-road Equipment Under 45 Yards	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Horizontal/directional Drill Locator	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Horizontal/directional Drill Operator	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Hydralifts/boom Trucks Over 10 Tons	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Hydralifts/boom Trucks, 10 Tons And Under	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Loader, Overhead 8 Yards. & Over	\$57.51	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Loader, Overhead, 6 Yards. But Not Including 8 Yards	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Loaders, Overhead Under 6 Yards	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Loaders, Plant Feed	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Loaders: Elevating Type Belt	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Locomotives, All	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-</a>	Material Transfer Device	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>



	<a href="#">Underground Sewer &amp; Water</a>					
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Mechanics, All (leadmen - \$0.50 Per Hour Over Mechanic)	\$57.51	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Motor Patrol Graders	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Mucking Machine, Mole, Tunnel Drill, Boring, Road Header And/or Shield	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Oil Distributors, Blower Distribution & Mulch Seeding Operator	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Outside Hoists (elevators And Manlifts), Air Tuggers, strato	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Overhead, Bridge Type Crane: 20 Tons Through 44 Tons	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Overhead, Bridge Type: 100 Tons And Over	\$57.51	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Overhead, Bridge Type: 45 Tons Through 99 Tons	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Pavement Breaker	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Pile Driver (other Than Crane Mount)	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Plant Oiler - Asphalt, Crusher	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Posthole Digger, Mechanical	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Power Plant	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Pumps - Water	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Quad 9, Hd 41, D10 And Over	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Quick Tower - No Cab, Under 100 Feet In Height Based To Boom	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Remote Control Operator On Rubber Tired Earth Moving Equipment	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Rigger And Bellman	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Rigger/Signal Person, Bellman (Certified)	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Rollagon	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators- Underground Sewer &amp; Water</a>	Roller, Other Than Plant Mix	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>

Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Roller, Plant Mix Or Multi-lift Materials	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Roto-mill, Roto-grinder	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Saws - Concrete	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Scraper, Self Propelled Under 45 Yards	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Scrapers - Concrete & Carry All	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Scrapers, Self-propelled: 45 Yards And Over	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Service Engineers - Equipment	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Shotcrete/gunite Equipment	\$53.57	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Shovel , Excavator, Backhoe, Tractors Under 15 Metric Tons.	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Shovel, Excavator, Backhoe: Over 30 Metric Tons To 50 Metric Tons	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Shovel, Excavator, Backhoes, Tractors: 15 To 30 Metric Tons	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Shovel, Excavator, Backhoes: Over 50 Metric Tons To 90 Metric Tons	\$57.51	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Shovel, Excavator, Backhoes: Over 90 Metric Tons	\$58.10	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Slipform Pavers	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Spreader, Topsider & Screedman	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Subgrader Trimmer	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Tower Bucket Elevators	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Tower Crane Up To 175' In Height Base To Boom	\$57.51	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Tower Crane: over 175' through 250' in height, base to boom	\$58.10	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Tower Cranes: over 250' in height from base to boom	\$58.67	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Transporters, All Track Or Truck Type	\$56.94	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Trenching Machines	\$56.00	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Truck Crane Oiler/driver - 100 Tons And Over	\$56.44	<a href="#">7A</a>	<a href="#">3C</a>	<a href="#">8P</a>

Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Truck Crane Oiler/driver Under 100 Tons	\$56.00	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Truck Mount Portable Conveyor	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Welder	\$56.94	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Wheel Tractors, Farmall Type	\$53.57	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Equipment Operators-Underground Sewer &amp; Water</a>	Yo Yo Pay Dozer	\$56.44	<u>7A</u>	<u>3C</u>	<u>8P</u>
Whatcom	<a href="#">Power Line Clearance Tree Trimmers</a>	Journey Level In Charge	\$45.75	<u>5A</u>	<u>4A</u>	
Whatcom	<a href="#">Power Line Clearance Tree Trimmers</a>	Spray Person	\$43.38	<u>5A</u>	<u>4A</u>	
Whatcom	<a href="#">Power Line Clearance Tree Trimmers</a>	Tree Equipment Operator	\$45.75	<u>5A</u>	<u>4A</u>	
Whatcom	<a href="#">Power Line Clearance Tree Trimmers</a>	Tree Trimmer	\$40.84	<u>5A</u>	<u>4A</u>	
Whatcom	<a href="#">Power Line Clearance Tree Trimmers</a>	Tree Trimmer Groundperson	\$30.74	<u>5A</u>	<u>4A</u>	
Whatcom	<a href="#">Refrigeration &amp; Air Conditioning Mechanics</a>	Journey Level	\$23.95		<u>1</u>	
Whatcom	<a href="#">Residential Brick Mason</a>	Journey Level	\$52.82	<u>5A</u>	<u>1M</u>	
Whatcom	<a href="#">Residential Carpenters</a>	Journey Level	\$23.81		<u>1</u>	
Whatcom	<a href="#">Residential Cement Masons</a>	Journey Level	\$27.28		<u>1</u>	
Whatcom	<a href="#">Residential Drywall Applicators</a>	Journey Level	\$25.00		<u>1</u>	
Whatcom	<a href="#">Residential Drywall Tapers</a>	Journey Level	\$23.91		<u>1</u>	
Whatcom	<a href="#">Residential Electricians</a>	Journey Level	\$37.65		<u>1</u>	
Whatcom	<a href="#">Residential Glaziers</a>	Journey Level	\$13.79		<u>1</u>	
Whatcom	<a href="#">Residential Insulation Applicators</a>	Journey Level	\$13.96		<u>1</u>	
Whatcom	<a href="#">Residential Laborers</a>	Journey Level	\$20.00		<u>1</u>	
Whatcom	<a href="#">Residential Marble Setters</a>	Journey Level	\$52.82	<u>5A</u>	<u>1M</u>	
Whatcom	<a href="#">Residential Painters</a>	Journey Level	\$17.43		<u>1</u>	
Whatcom	<a href="#">Residential Plumbers &amp; Pipefitters</a>	Journey Level	\$28.26		<u>1</u>	
Whatcom	<a href="#">Residential Refrigeration &amp; Air Conditioning Mechanics</a>	Journey Level	\$37.72	<u>5A</u>	<u>1G</u>	
Whatcom	<a href="#">Residential Sheet Metal Workers</a>	Journey Level (Field or Shop)	\$34.87	<u>7J</u>	<u>1I</u>	
Whatcom	<a href="#">Residential Soft Floor Layers</a>	Journey Level	\$23.46		<u>1</u>	
Whatcom	<a href="#">Residential Sprinkler Fitters (Fire Protection)</a>	Journey Level	\$13.23		<u>1</u>	
Whatcom	<a href="#">Residential Stone Masons</a>	Journey Level	\$52.82	<u>5A</u>	<u>1M</u>	
Whatcom	<a href="#">Residential Terrazzo Workers</a>	Journey Level	\$9.47		<u>1</u>	
Whatcom	<a href="#">Residential Terrazzo/Tile Finishers</a>	Journey Level	\$14.00		<u>1</u>	

Whatcom	<a href="#">Residential Tile Setters</a>	Journey Level	\$9.47		<u>1</u>	
Whatcom	<a href="#">Roofers</a>	Journey Level	\$25.27		<u>1</u>	
Whatcom	<a href="#">Sheet Metal Workers</a>	Journey Level (Field or Shop)	\$59.42	<u>7E</u>	<u>1E</u>	
Whatcom	<a href="#">Shipbuilding &amp; Ship Repair</a>	Boilermaker	\$40.87	<u>7M</u>	<u>1H</u>	
Whatcom	<a href="#">Shipbuilding &amp; Ship Repair</a>	Carpenter	\$15.16		<u>1</u>	
Whatcom	<a href="#">Shipbuilding &amp; Ship Repair</a>	Crane Operator	\$16.04		<u>1</u>	
Whatcom	<a href="#">Shipbuilding &amp; Ship Repair</a>	Electrician	\$15.18		<u>1</u>	
Whatcom	<a href="#">Shipbuilding &amp; Ship Repair</a>	Heat & Frost Insulator	\$63.18	<u>5J</u>	<u>1S</u>	
Whatcom	<a href="#">Shipbuilding &amp; Ship Repair</a>	Inside Machinist	\$16.70		<u>1</u>	
Whatcom	<a href="#">Shipbuilding &amp; Ship Repair</a>	Laborer	\$23.38		<u>1</u>	
Whatcom	<a href="#">Shipbuilding &amp; Ship Repair</a>	Outside Machinist	\$14.69		<u>1</u>	
Whatcom	<a href="#">Shipbuilding &amp; Ship Repair</a>	Painter	\$15.16		<u>1</u>	
Whatcom	<a href="#">Shipbuilding &amp; Ship Repair</a>	Pipefitter	\$15.18		<u>1</u>	
Whatcom	<a href="#">Shipbuilding &amp; Ship Repair</a>	Sheet Metal	\$20.26		<u>1</u>	
Whatcom	<a href="#">Shipbuilding &amp; Ship Repair</a>	Welder/burner	\$15.21		<u>1</u>	
Whatcom	<a href="#">Sign Makers &amp; Installers (Electrical)</a>	Journey Level	\$16.03		<u>1</u>	
Whatcom	<a href="#">Sign Makers &amp; Installers (Non-Electrical)</a>	Journey Level	\$14.23		<u>1</u>	
Whatcom	<a href="#">Soft Floor Layers</a>	Journey Level	\$44.11	<u>5A</u>	<u>3D</u>	
Whatcom	<a href="#">Solar Controls For Windows</a>	Journey Level	\$9.47		<u>1</u>	
Whatcom	<a href="#">Sprinkler Fitters (Fire Protection)</a>	Journey Level	\$54.76	<u>7J</u>	<u>1R</u>	
Whatcom	<a href="#">Stage Rigging Mechanics (Non Structural)</a>	Journey Level	\$13.23		<u>1</u>	
Whatcom	<a href="#">Stone Masons</a>	Journey Level	\$52.82	<u>5A</u>	<u>1M</u>	
Whatcom	<a href="#">Street And Parking Lot Sweeper Workers</a>	Journey Level	\$15.00		<u>1</u>	
Whatcom	<a href="#">Surveyors</a>	All Classifications	\$36.16	<u>Null</u>	<u>1</u>	
Whatcom	<a href="#">Telecommunication Technicians</a>	Journey Level	\$43.32	<u>7E</u>	<u>1E</u>	
Whatcom	<a href="#">Telephone Line Construction - Outside</a>	Cable Splicer	\$37.60	<u>5A</u>	<u>2B</u>	
Whatcom	<a href="#">Telephone Line Construction - Outside</a>	Hole Digger/Ground Person	\$20.79	<u>5A</u>	<u>2B</u>	
Whatcom	<a href="#">Telephone Line Construction - Outside</a>	Installer (Repairer)	\$36.02	<u>5A</u>	<u>2B</u>	
Whatcom	<a href="#">Telephone Line Construction - Outside</a>	Special Aparatus Installer I	\$37.60	<u>5A</u>	<u>2B</u>	
Whatcom	<a href="#">Telephone Line Construction - Outside</a>	Special Apparatus Installer II	\$36.82	<u>5A</u>	<u>2B</u>	
Whatcom	<a href="#">Telephone Line Construction - Outside</a>	Telephone Equipment Operator (Heavy)	\$37.60	<u>5A</u>	<u>2B</u>	
Whatcom	<a href="#">Telephone Line Construction - Outside</a>	Telephone Equipment Operator (Light)	\$34.94	<u>5A</u>	<u>2B</u>	
Whatcom	<a href="#">Telephone Line Construction -</a>	Telephone Lineperson	\$34.93	<u>5A</u>	<u>2B</u>	

	<a href="#">Outside</a>					
Whatcom	<a href="#">Telephone Line Construction - Outside</a>	Television Groundperson	\$19.73	<u>5A</u>	<u>2B</u>	
Whatcom	<a href="#">Telephone Line Construction - Outside</a>	Television Lineperson/Installer	\$26.31	<u>5A</u>	<u>2B</u>	
Whatcom	<a href="#">Telephone Line Construction - Outside</a>	Television System Technician	\$31.50	<u>5A</u>	<u>2B</u>	
Whatcom	<a href="#">Telephone Line Construction - Outside</a>	Television Technician	\$28.23	<u>5A</u>	<u>2B</u>	
Whatcom	<a href="#">Telephone Line Construction - Outside</a>	Tree Trimmer	\$34.93	<u>5A</u>	<u>2B</u>	
Whatcom	<a href="#">Terrazzo Workers</a>	Journey Level	\$47.46	<u>5A</u>	<u>1M</u>	
Whatcom	<a href="#">Tile Setters</a>	Journey Level	\$47.46	<u>5A</u>	<u>1M</u>	
Whatcom	<a href="#">Tile, Marble &amp; Terrazzo Finishers</a>	Finisher	\$38.29	<u>5A</u>	<u>1B</u>	
Whatcom	<a href="#">Traffic Control Stripers</a>	Journey Level	\$17.41		<u>1</u>	
Whatcom	<a href="#">Truck Drivers</a>	Asphalt Mix	\$30.15		<u>1</u>	
Whatcom	<a href="#">Truck Drivers</a>	Dump Truck	\$19.32		<u>1</u>	
Whatcom	<a href="#">Truck Drivers</a>	Dump Truck And Trailer	\$19.32		<u>1</u>	
Whatcom	<a href="#">Truck Drivers</a>	Other Trucks	\$14.48		<u>1</u>	
Whatcom	<a href="#">Truck Drivers</a>	Transit Mixer	\$16.81		<u>1</u>	
Whatcom	<a href="#">Well Drillers &amp; Irrigation Pump Installers</a>	Irrigation Pump Installer	\$15.00		<u>1</u>	
Whatcom	<a href="#">Well Drillers &amp; Irrigation Pump Installers</a>	Oiler	\$9.47		<u>1</u>	
Whatcom	<a href="#">Well Drillers &amp; Irrigation Pump Installers</a>	Well Driller	\$18.02		<u>1</u>	



Benefit Code Key – Effective 3/2/2016 thru 8/30/2016

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**Overtime Codes**

**Overtime calculations** are based on the hourly rate actually paid to the worker. On public works projects, the hourly rate must be not less than the prevailing rate of wage minus the hourly rate of the cost of fringe benefits actually provided for the worker.

1. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.
  - B. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
  - C. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
  - D. The first two (2) hours before or after a five-eight (8) hour workweek day or a four-ten (10) hour workweek day and the first eight (8) hours worked the next day after either workweek shall be paid at one and one-half times the hourly rate of wage. All additional hours worked and all worked on Sundays and holidays shall be paid at double the hourly rate of wage.
  - E. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
  - F. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours worked, except Labor Day, shall be paid at double the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage.
  - G. The first ten (10) hours worked on Saturdays and the first ten (10) hours worked on a fifth calendar weekday in a four-ten hour schedule, shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of ten (10) hours per day Monday through Saturday and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
  - H. All hours worked on Saturdays (except makeup days if work is lost due to inclement weather conditions or equipment breakdown) shall be paid at one and one-half times the hourly rate of wage. All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
  - I. All hours worked on Sundays and holidays shall also be paid at double the hourly rate of wage.
  - J. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked over ten (10) hours Monday through Saturday, Sundays and holidays shall be paid at double the hourly rate of wage.
  - K. All hours worked on Saturdays and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.
  - M. All hours worked on Saturdays (except makeup days if work is lost due to inclement weather conditions) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
  - N. All hours worked on Saturdays (except makeup days) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

**Overtime Codes Continued**

1. O. The first ten (10) hours worked on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays, holidays and after twelve (12) hours, Monday through Friday and after ten (10) hours on Saturday shall be paid at double the hourly rate of wage.
- P. All hours worked on Saturdays (except makeup days if circumstances warrant) and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.
- Q. The first two (2) hours after eight (8) regular hours Monday through Friday and up to ten (10) hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of ten (10) hours per day Monday through Saturday and all hours worked on Sundays and holidays (except Christmas day) shall be paid at double the hourly rate of wage. All hours worked on Christmas day shall be paid at two and one-half times the hourly rate of wage.
- R. All hours worked on Sundays and holidays shall be paid at two times the hourly rate of wage.
- S. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays and all other overtime hours worked, except Labor Day, shall be paid at double the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage.
- U. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays (except Labor Day) shall be paid at two times the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage.
- V. All hours worked on Sundays and holidays (except Thanksgiving Day and Christmas day) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Thanksgiving Day and Christmas day shall be paid at double the hourly rate of wage.
- W. All hours worked on Saturdays and Sundays (except make-up days due to conditions beyond the control of the employer)) shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.
- X. The first four (4) hours after eight (8) regular hours Monday through Friday and the first twelve (12) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked over twelve (12) hours Monday through Saturday, Sundays and holidays shall be paid at double the hourly rate of wage. When holiday falls on Saturday or Sunday, the day before Saturday, Friday, and the day after Sunday, Monday, shall be considered the holiday and all work performed shall be paid at double the hourly rate of wage.
- Y. All hours worked outside the hours of 5:00 am and 5:00 pm (or such other hours as may be agreed upon by any employer and the employee) and all hours worked in excess of eight (8) hours per day (10 hours per day for a 4 x 10 workweek) and on Saturdays and holidays (except labor day) shall be paid at one and one-half times the hourly rate of wage. (except for employees who are absent from work without prior approval on a scheduled workday during the workweek shall be paid at the straight-time rate until they have worked 8 hours in a day (10 in a 4 x 10 workweek) or 40 hours during that workweek.) All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and Labor Day shall be paid at double the hourly rate of wage.
- Z. All hours worked on Saturdays and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid the straight time rate of pay in addition to holiday pay.



**Overtime Codes Continued**

2. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.
- B. All hours worked on holidays shall be paid at one and one-half times the hourly rate of wage.
  - C. All hours worked on Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at two times the hourly rate of wage.
  - F. The first eight (8) hours worked on holidays shall be paid at the straight hourly rate of wage in addition to the holiday pay. All hours worked in excess of eight (8) hours on holidays shall be paid at double the hourly rate of wage.
  - G. All hours worked on Sunday shall be paid at two times the hourly rate of wage. All hours worked on paid holidays shall be paid at two and one-half times the hourly rate of wage including holiday pay.
  - H. All hours worked on Sunday shall be paid at two times the hourly rate of wage. All hours worked on holidays shall be paid at one and one-half times the hourly rate of wage.
  - O. All hours worked on Sundays and holidays shall be paid at one and one-half times the hourly rate of wage.
  - R. All hours worked on Sundays and holidays and all hours worked over sixty (60) in one week shall be paid at double the hourly rate of wage.
  - U. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked over 12 hours in a day or on Sundays and holidays shall be paid at double the hourly rate of wage.
  - W. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage. On a four-day, ten-hour weekly schedule, either Monday thru Thursday or Tuesday thru Friday schedule, all hours worked after ten shall be paid at double the hourly rate of wage. The first eight (8) hours worked on the fifth day shall be paid at one and one-half times the hourly rate of wage. All other hours worked on the fifth, sixth, and seventh days and on holidays shall be paid at double the hourly rate of wage.
3. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.
- A. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal shift, and all work on Saturdays shall be paid at time and one-half the straight time rate. Hours worked over twelve hours (12) in a single shift and all work performed after 6:00 pm Saturday to 6:00 am Monday and holidays shall be paid at double the straight time rate of pay. Any shift starting between the hours of 6:00 pm and midnight shall receive an additional one dollar (\$1.00) per hour for all hours worked that shift. The employer shall have the sole discretion to assign overtime work to employees. Primary consideration for overtime work shall be given to employees regularly assigned to the work to be performed on overtime situations. After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.
  - C. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal shift, and all work on Saturdays shall be paid at one and one-half times the hourly rate of wage. All work performed after 6:00 pm Saturday to 5:00 am Monday and Holidays shall be paid at double the hourly rate of wage. After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

**Overtime Codes Continued**

3.
  - D. All hours worked between the hours of 6:00 pm and 6:00 am, Monday through Saturday, shall be paid at a premium rate of 15% over the hourly rate of wage. All other hours worked after 6:00 am on Saturdays, shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
  - E. All hours worked Sundays and holidays shall be paid at double the hourly rate of wage. Each week, once 40 hours of straight time work is achieved, then any hours worked over 10 hours per day Monday through Saturday shall be paid at double the hourly wage rate.
  - F. All hours worked on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sunday shall be paid at two times the hourly rate of wage. All hours worked on paid holidays shall be paid at two and one-half times the hourly rate of wage including holiday pay.
  - H. All work performed on Sundays between March 16th and October 14th and all Holidays shall be compensated for at two (2) times the regular rate of pay. Work performed on Sundays between October 15th and March 15th shall be compensated at one and one half (1-1/2) times the regular rate of pay.
  - I. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. In the event the job is down due to weather conditions during a five day work week (Monday through Friday,) or a four day-ten hour work week (Tuesday through Friday,) then Saturday may be worked as a voluntary make-up day at the straight time rate. However, Saturday shall not be utilized as a make-up day when a holiday falls on Friday. All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
4. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.
  - A. All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at double the hourly rate of wage. All hours worked on Saturdays, Sundays and holidays shall be paid at double the hourly rate of wage.
  - B. All hours worked over twelve (12) hours per day and all hours worked on holidays shall be paid at double the hourly rate of wage.
  - C. On Monday through Friday, the first four (4) hours of overtime after eight (8) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay, unless a four (4) day ten (10) hour workweek has been established. On a four (4) day ten (10) hour workweek scheduled Monday through Thursday, or Tuesday through Friday, the first two (2) hours of overtime after ten (10) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay. On Saturday, the first twelve (12) hours of work shall be paid at one and one half (1-1/2) times the straight time rate of pay, except that if the job is down on Monday through Friday due to weather conditions or other conditions outside the control of the employer, the first ten (10) hours on Saturday may be worked at the straight time rate of pay. All hours worked over twelve (12) hours in a day and all hours worked on Sunday and Holidays shall be paid at two (2) times the straight time rate of pay.

**Overtime Codes Continued**

4. D. All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at double the hourly rate of wage. All hours worked on Saturday, Sundays and holidays shall be paid at double the hourly rate of pay. Rates include all members of the assigned crew.

**EXCEPTION:**

On all multipole structures and steel transmission lines, switching stations, regulating, capacitor stations, generating plants, industrial plants, associated installations and substations, except those substations whose primary function is to feed a distribution system, will be paid overtime under the following rates:

The first two (2) hours after eight (8) regular hours Monday through Friday of overtime on a regular workday, shall be paid at one and one-half times the hourly rate of wage. All hours in excess of ten (10) hours will be at two (2) times the hourly rate of wage. The first eight (8) hours worked on Saturday will be paid at one and one-half (1-1/2) times the hourly rate of wage. All hours worked in excess of eight (8) hours on Saturday, and all hours worked on Sundays and holidays will be at the double the hourly rate of wage.

All overtime eligible hours performed on the above described work that is energized, shall be paid at the double the hourly rate of wage.

- E. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

On a four-day, ten-hour weekly schedule, either Monday thru Thursday or Tuesday thru Friday schedule, all hours worked after ten shall be paid at double the hourly rate of wage. The Monday or Friday not utilized in the normal four-day, ten hour work week, and Saturday shall be paid at one and one half (1½) times the regular shift rate for the first eight (8) hours. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

- F. All hours worked between the hours of 6:00 pm and 6:00 am, Monday through Saturday, shall be paid at a premium rate of 20% over the hourly rate of wage. All hours worked on Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.
- G. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

**Holiday Codes**

5. A. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, and Christmas Day (7).
- B. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, the day before Christmas, and Christmas Day (8).
- C. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8).
- D. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8).
- H. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, the Day after Thanksgiving Day, And Christmas (6).

**Holiday Codes Continued**

5. I. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6).
- J. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Eve Day, And Christmas Day (7).
- K. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday After Thanksgiving Day, The Day Before Christmas, And Christmas Day (9).
- L. Holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (8).
- N. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, The Friday After Thanksgiving Day, And Christmas Day (9).
- P. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday And Saturday After Thanksgiving Day, The Day Before Christmas, And Christmas Day (9). If A Holiday Falls On Sunday, The Following Monday Shall Be Considered As A Holiday.
- Q. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6).
- R. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Day After Thanksgiving Day, One-Half Day Before Christmas Day, And Christmas Day. (7 1/2).
- S. Paid Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, And Christmas Day (7).
- T. Paid Holidays: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, Christmas Day, And The Day Before Or After Christmas (9).
- Z. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8).
6. A. Paid Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8).
- E. Paid Holidays: New Year's Day, Day Before Or After New Year's Day, Presidents Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and a Half-Day On Christmas Eve Day. (9 1/2).
- G. Paid Holidays: New Year's Day, Martin Luther King Jr. Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and Christmas Eve Day (11).
- H. Paid Holidays: New Year's Day, New Year's Eve Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday After Thanksgiving Day, Christmas Day, The Day After Christmas, And A Floating Holiday (10).
- I. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday After Thanksgiving Day, And Christmas Day (7).

**Holiday Codes Continued**

6. T. Paid Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, The Last Working Day Before Christmas Day, And Christmas Day (9).
- Z. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (7). If a holiday falls on Saturday, the preceding Friday shall be considered as the holiday. If a holiday falls on Sunday, the following Monday shall be considered as the holiday.
7. A. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any Holiday Which Falls On A Sunday Shall Be Observed As A Holiday On The Following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.
- B. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- C. Holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- D. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8). Unpaid Holidays: President's Day. Any paid holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any paid holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- E. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- F. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the last working day before Christmas day and Christmas day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- G. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.
- H. Holidays: New Year's Day, Martin Luther King Jr. Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- I. Holidays: New Year's Day, President's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, The Day Before Christmas Day And Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- J. Holidays: New Year's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day and Christmas Day (6). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

**Holiday Codes Continued**

7. K. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- L. Holidays: New Year's Day, Memorial Day, Labor Day, Independence Day, Thanksgiving Day, the Last Work Day before Christmas Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- M. Paid Holidays: New Year's Day, The Day after or before New Year's Day, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, And the Day after or before Christmas Day (10). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
- N. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. When Christmas falls on a Saturday, the preceding Friday shall be observed as a holiday.
- P. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.
- Q. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.
- R. Paid Holidays: New Year's Day, the day after or before New Year's Day, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and the day after or before Christmas Day (10). If any of the listed holidays fall on Saturday, the preceding Friday shall be observed as the holiday. If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.
- S. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Day, the Day after Christmas, and A Floating Holiday (9). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.
- T. Paid Holidays: New Year's Day, the Day after or before New Year's Day, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and The Day after or before Christmas Day. (10). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

**Note Codes**

8. A. In addition to the hourly wage and fringe benefits, the following depth premiums apply to depths of fifty feet or more:  
Over 50' To 100' -\$2.00 per Foot for Each Foot Over 50 Feet  
Over 100' To 150' -\$3.00 per Foot for Each Foot Over 100 Feet  
Over 150' To 220' -\$4.00 per Foot for Each Foot Over 150 Feet  
Over 220' -\$5.00 per Foot for Each Foot Over 220 Feet

**Note Codes Continued**

8. C. In addition to the hourly wage and fringe benefits, the following depth premiums apply to depths of fifty feet or more:  
Over 50' To 100' -\$1.00 per Foot for Each Foot Over 50 Feet  
Over 100' To 150' -\$1.50 per Foot for Each Foot Over 100 Feet  
Over 150' To 200' -\$2.00 per Foot for Each Foot Over 150 Feet  
Over 200' -Divers May Name Their Own Price
- D. Workers working with supplied air on hazmat projects receive an additional \$1.00 per hour.
- L. Workers on hazmat projects receive additional hourly premiums as follows -Level A: \$0.75, Level B: \$0.50, And Level C: \$0.25.
- M. Workers on hazmat projects receive additional hourly premiums as follows: Levels A & B: \$1.00, Levels C & D: \$0.50.
- N. Workers on hazmat projects receive additional hourly premiums as follows -Level A: \$1.00, Level B: \$0.75, Level C: \$0.50, And Level D: \$0.25.
- P. Workers on hazmat projects receive additional hourly premiums as follows -Class A Suit: \$2.00, Class B Suit: \$1.50, Class C Suit: \$1.00, And Class D Suit \$0.50.
- Q. The highest pressure registered on the gauge for an accumulated time of more than fifteen (15) minutes during the shift shall be used in determining the scale paid.
- R. Effective August 31, 2012 – A Traffic Control Supervisor shall be present on the project whenever flagging or spotting or other traffic control labor is being utilized. A Traffic Control Laborer performs the setup, maintenance and removal of all temporary traffic control devices and construction signs necessary to control vehicular, bicycle, and pedestrian traffic during construction operations. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. These classifications are only effective on or after August 31, 2012.
- S. Effective August 31, 2012 – A Traffic Control Supervisor shall be present on the project whenever flagging or spotting or other traffic control labor is being utilized. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. This classification is only effective on or after August 31, 2012.
- T. Effective August 31, 2012 – A Traffic Control Laborer performs the setup, maintenance and removal of all temporary traffic control devices and construction signs necessary to control vehicular, bicycle, and pedestrian traffic during construction operations. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. This classification is only effective on or after August 31, 2012.
- U. Workers on hazmat projects receive additional hourly premiums as follows – Class A Suit: \$2.00, Class B Suit: \$1.50, And Class C Suit: \$1.00. Workers performing underground work receive an additional \$0.40 per hour for any and all work performed underground, including operating, servicing and repairing of equipment. The premium for underground work shall be paid for the entire shift worked. Workers who work suspended by a rope or cable receive an additional \$0.50 per hour. The premium for work suspended shall be paid for the entire shift worked. Workers who do “pioneer” work (break open a cut, build road, etc.) more than one hundred fifty (150) feet above grade elevation receive an additional \$0.50 per hour.





**DRAWINGS**  
(SEPARATE SET)

