CONTRACT DOCUMENTS
FOR THE
CONSTRUCTION OF

WATER TREATMENT PLANT STANDBY GENERATOR

PROJECT No. 20WA03

CITY OF ROSEBURG
PUBLIC WORKS DEPARTMENT
DOUGLAS COUNTY, OREGON

Summer 2021

PREPARED BY:
RH2 Engineering, Inc.
3523 Arrowhead Drive
Suite 200
Medford, OR 97504
(541) 665-5233

REGISTERED PROFESSIONAL ENGINEER
86610
OREGON
MAR. 13, 2012
CHRISTOPHER M. ROBERTS

Signed: 05/27/2021

EXPIRES: 12/31/2022

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CITY OF ROSEBURG
ADVERTISEMENT FOR BID

Project Name: **Water Treatment Plant Standby Generator**
Project Number: **20WA03**
Project Description: The proposed work generally consists of furnishing all labor, equipment, materials and supervision for the installation of permanent standby diesel generators at the City's Water Treatment Plant and Reservoir Hill locations, installation of a diesel fuel tank at the City's Water Treatment Plant, and electrical system improvements at the City's Water Treatment Plant, Reservoir Hill, Dixonville Pump Station No. 2, Garden Valley Pump Station, Hawthorne Pump Station, Kline Pump Station, and Ventura Pump Station. Construction at the Water Treatment Plant and Reservoir Hill includes site work and construction of concrete pads. This project also includes the provision of two (2) portable generators.

If applicable: A non-mandatory Prebid Meeting will be held on Thursday, September 16th at 11:00am at:

City of Roseburg Water Treatment Plant
180 Pioneer Way
Roseburg, OR 97470

Bids are due by 2:00 p.m. on Thursday September 30, 2021
All bids will be opened at 2:00 p.m.
Additional forms disclosing first tier subcontractors are due by 4:00 p.m.
No bids shall be received after this date and time.

Contact – Submit bids to:
City of Roseburg ACM/City Recorder
900 SE Douglas
Roseburg OR 97470
(541) 492-6866
bids@cityofroseburg.org

Address Technical Questions to:
Chris Roberts, PE
RH2 Engineering, Inc.
22722 29th Drive SE, STE 210
Bothell, WA 98021
425.951.5358
croberts@rh2.com

SOLICITATION DOCUMENTS: Solicitation documents, including contract terms, conditions, specifications, all attachments and/or addenda for the Invitation to Bid are available for review at the above contact address. Bid documents will not be mailed to prospective bidders, but may be downloaded from OregonBuys through the following internet address: http://oregonbuys.gov/bso/. Bidders without access to Oregon Buys may download the documents at a Plan Center or the City of Roseburg's website at www.cityofroseburg.org under "Bidding Opportunities."

Bidders must be pre-qualified in accordance with the laws of Oregon and the Information to Bidders at least ten days prior to the date of bid opening. Bidders must be licensed with the Oregon Construction Contractors Board and comply with City of Roseburg Municipal Code.

The resulting public works contract is subject to ORS 279C.800 to 279C.870 or the Davis-Bacon Act (40 U.S.C. 3141 to 3148). No bid will be considered unless the bid contains a statement that the bidder will comply with the provisions of ORS 279C.840 (Prevailing Wage Rates).

INVITATION TO BID

The City of Roseburg will receive sealed bids or bids submitted via email marked **"Bid for Water Treatment Plant Standby Power"** until the hour of 2:00 p.m. on **Thursday September 30, 2021**, at which time they will be publicly opened and read in person or virtually. If opened virtually, a link will be posted on the City's website at https://www.cityofroseburg.org/bidding no later than 24 hours prior to the opening. When required by ORS 279C.370, bidders must submit a list of their first-tier subcontractors providing labor, or labor and materials, no later than 4:00 p.m. that same day. Bids shall be addressed and delivered to Amy L. Sowa, ACM/City Recorder, City Hall, 900 SE Douglas Avenue, Roseburg, Oregon 97470, or emailed to bids@cityofroseburg.org. Any and all bids received after the 2:00 p.m. deadline for submission, or for which the list of first-tier subcontractors has not been submitted by 4:00 p.m. that same day, shall be considered nonresponsive and returned to the bidder. All bidders must list their "Construction Contractors Board" or "State Landscape Contractors Board" license number as required by ORS 701.021 or 671.530 on the bid form. The proposed work generally consists of furnishing all labor, equipment, materials and supervision for the installation of permanent standby diesel generators at the City's Water Treatment Plant and Reservoir Hill locations, installation of a diesel fuel tank at the City's Water Treatment Plant, and electrical system improvements at the City's Water Treatment Plant, Reservoir Hill, Dixonville Pump Station No. 2, Garden Valley Pump Station, Hawthorne Pump Station, Kline Pump Station, and Ventura Pump Station. Construction at the Water Treatment Plant and Reservoir Hill includes site work and construction of concrete pads. This project also includes the provision of two (2) portable generators. The bids will be evaluated as **lump sum without additive or deductive alternates pursuant to OAR 137-049-0380(2)(a).** The proposed work will require the bidder to meet the highest standards prevalent in the industry or business related to the work to be performed. Failure to meet such standards may result in a reduction or withholding of payment; require bidder to provide, at bidder's own expense, additional work required to meet such standards; or termination of the contract, with damages being sought. Technical questions regarding the work to be performed should be addressed to:

Chris Roberts, PE
RH2 Engineering, Inc.
22722 29th Drive SE, STE 210
Bothell, WA 98021
425.951.5358
croberts@rh2.com

Bids must be accompanied by a certified check, cashier's check, irrevocable letter of credit or Bid Bond in an amount equal to not less than ten percent (10%) of the total amount of the bid. Bidders shall state as part of the bid that the provisions of ORS 279C.800 to 279C.870 (Prevailing Wage Rates) shall be complied with; provided however, if the project is subject to the federal prevailing rates of wage under the Davis-Bacon Act (40 U.S.C. 3141 et seq.) or if the project is subject to both the state and federal prevailing rates of wage, the bid must contain a statement by the bidder that contractor and every subcontractor shall pay the higher of the applicable state or federal prevailing rate of wage to all workers on the project. Bidders must also certify as part of the bid that the requirements of ORS 279C.505(2) (Employee Drug Testing Program) shall be complied with. Bidders must be pre-qualified in accordance with the laws of Oregon and the Information to Bidders. Each bid must contain a statement as to

whether the bidder is a resident bidder, as defined in ORS 279A.120. Bidders are not required to be licensed under ORS 468A.720 (Asbestos Abatement). However, the successful bidder shall at all times during the project provide qualified staff on site that is able to identify asbestos containing material. Bidders are hereby notified there are underground pipelines and structures containing asbestos within the City of Roseburg. If any such material is encountered during the project, the bidder shall thereupon be required to notify the City and comply with all requirements of applicable laws and regulations. Unless exempt under ORS 279C.800 to 279C.870, the successful bidder must file a $30,000 Public Works Bond with the Construction Contractors Board prior to beginning work on the project, and certify that all sub-contractors have also filed such bond. Bidders must agree to use recyclable products to the maximum extent financially feasible**. Bidders with 50 or more employees and for contracts over $500,000, are required to possess a certificate issued by the Department of Administrative Services for completion of pay equity training (NEW).**

The City of Roseburg may reject any bid not in compliance with all public bidding procedures and requirements, including the requirement to demonstrate the bidder's responsibility under ORS 279C.375(3)(b), may waive any irregularities, and may reject for good cause any or all bids upon a finding of the City it is the public interest to do so. The City may also cancel this invitation in accordance with OAR 137-049-0270.

Dated this 3rd day of September, 2021.

CITY OF ROSEBURG, DOUGLAS COUNTY, OREGON
/s/ Amy L. Sowa, ACM/City Recorder

INFORMATION TO BIDDERS

1. FORM OF BID

All bids must be made upon the blank Bid Form attached hereto and must give a price for each item and an aggregate amount or a lump sum price as required in the Bid Form.

The City reserves the right to reject any or all bids or to accept the bid deemed in the best interest of the City. Without limiting the generality of the foregoing, the City may reject any bid which is incomplete, obscure or irregular; which omits any one or more items in the price sheet; in which unit prices are obviously unbalanced; or which is accompanied by an insufficient or irregular Bid Bond.

The bidder shall sign the Bid Form in the blank space provided therefore. All bids must contain the bidder's tax identification number. Bids made by a corporation, general or limited partnership, or L.L.C., shall contain the name and address of such organization, together with names and addresses of officers, partners or managing members. If the bid is made by a corporation, it must be signed by one of the corporate officers with the authority to sign for the corporation; if made by a partnership, by one of the partners.

All bids must be submitted at the time and place, and in the manner prescribed in the Invitation to Bid.

2. BID PROTEST; REQUEST FOR CHANGE OR CLARIFICATION

A bidder may protest, or request a change in items in the bid documents, including contract terms and conditions or specifications, by filing a written protest with the City not less than ten (10) calendar days prior to the bid submission deadline. Such written protest or request for change must include a detailed statement of the grounds for the protest and a statement of the desired changes to the contract terms and conditions or specifications.

The City shall not consider a bidder's protest or request for change after the deadline for submitting such protest or request. The City shall provide notice to the bidder if it entirely rejects the bidder's protest or request for change. If the City agrees with the bidder's protest or request, in whole or in part, the City shall issue a written Addendum to the bid documents or specifications.

Prior to the deadline for submitting a written protest or request for change, a bidder may request that the City clarify any provision of the bid documents. The City's clarification to a bidder, whether orally or in writing, shall not change the bid documents and is not binding on the City unless the City amends the bid documents by issuing a written addendum.

If a written addendum is issued by the City, all bidders must provide written acknowledgement, with their bids, of receipt of all issued addenda.

3. CONTRACT DOCUMENTS

The Contract Documents for this Project consist of, but are not necessarily limited to, the Invitation to Bid, Information to Bidders, Bid Form, Construction Contract including Exhibit "A" Standard City Contract Provisions, First-Tier Subcontractor Disclosure Form, Drug Testing Program Certification Form, Bidder's Responsibility Form, Performance Bond, Payment Bond, Public Works Bond Filing Certification form (when required), Pay Equity Compliance Certification (when applicable), General Conditions, Technical Provisions, Special Conditions, Standard Drawings, Specifications and Plans and Supplemental Specifications, all as required for the full execution and satisfactory completion of the Project. Any person contemplating the submission of a bid and being in doubt as to the meaning or intent of said Contract Documents should request of the City, in writing, an interpretation thereof. Any interpretation of said Contract Documents shall be made only in writing by the City.

4. ESTIMATE OF QUANTITIES

The estimate of quantities of work to be done as stated in the Bid Form, although stated with as much accuracy as possible, is approximate only and is assumed solely for the purpose of comparing bids. The quantities on which payments will be made to the Contractor are to be determined by measurement of the work actually performed and paid at the unit price bid, regardless of the amount of increase or decrease in the estimated quantities as specified in the Contract Documents. The City reserves the right to increase or diminish the amount of any class of work as may be deemed necessary.

5. CONSTRUCTION CONTRACTORS' BOARD - STATE LANDSCAPE CONTRACTORS' BOARD

All contractors bidding on public contracts must be licensed with the Construction Contractors' Board or the State Landscape Contractors Board as required by ORS 701.021 or 671.530. Bids must be identified with the Contractors' Board license number. No bids will be considered without this information.

6. DISCLOSURE OF FIRST-TIER SUBCONTRACTORS

When a public improvement contract value is greater than $100,000, all bidders are required to disclose information about first-tier subcontractors, providing labor or labor and materials, when the contract amount of such first-tier subcontractor is equal to or greater than:

1) 5% of the project bid, or $15,000, whichever is greater; or
2) $350,000 regardless of the percentage of the total bid.

Bidders must disclose the following information about such subcontracts, on the First-Tier Subcontractor Disclosure Form provided by the City and included herein, within two hours of the bid submission deadline:

1) The subcontractor's name;
2) The subcontract dollar value; and
3) The category of work to be performed by the subcontractor.

Any bidder not using subcontractors subject to the above disclosure form, must write "NONE" on the Disclosure Form and sign and submit the form. The City will reject a bid if the bidder fails to submit the Disclosure Form before the deadline.

7. DRUG TESTING PROGRAM

ORS 279C.505(2) requires public improvement contracts to include a provision requiring contractors to demonstrate that they have an employee drug and alcohol testing program in place. All bidders are required to certify, on the Drug Testing Program Certification Form provided by the City and included herein, that they have such program in place. This certification will become part of the Contract if awarded and contractor will be required to maintain such program throughout the performance of the Contract. Failure to maintain a program shall constitute a material breach of the Contract.

8. PROMPT PAY POLICY - TIMELY PROGRESS PAYMENTS

ORS 279C.570 and 279C.580 require prompt payment to contractors and subcontractors and provides for settlement of compensation disputes between the parties. The City is required to automatically calculate and pay interest on invoices from the contractor when payments become overdue. The interest commences thirty (30) calendar days after receipt of the invoice from the contractor, or fifteen (15) calendar days after the payment is approved by the City, whichever is earlier. The rate of interest charged to the City on the amount due shall equal three times the discount rate on 90-day commercial paper, but shall not exceed 30 percent.

The City is also required to ensure that the contractor includes a clause in each subcontract that obligates the contractor to pay first-tier subcontractors for satisfactory performance under its contract. Contractors must pay subcontractors within ten (10) calendar days of receiving payment from the City. Contracts between primary contractors and subcontractors must also contain an interest penalty clause that obligates the contractor, if payment is not made to the subcontractor within thirty (30) calendar days after receipt of payment from the City, to pay the first-tier subcontractor an interest penalty on amounts due in the case of each payment not made in accordance with the subcontract payment clause. The contractor is also required to ensure that first-tier subcontractors include these requirements in each of its subcontracts with lower-tier subcontractors or suppliers.

If requested in writing by a first-tier subcontractor, within ten (10) calendar days after receiving the request, the contractor must provide the first-tier subcontractor, a copy of that portion of any invoice or request for payment submitted to the City, or pay document provided by the City to the contractor, specifically related to any labor or materials supplied by the first-tier subcontractor.

9. PRE-QUALIFICATION OF BIDDERS

Bidders shall pre-qualify under ORS 279C.430 and 279C.435, and shall submit the information requested on the form furnished by the City. This information shall be submitted at least ten (10) calendar days prior to the date of bid opening. Bidder qualifications are approved on a calendar year basis and must be renewed annually by filing a new pre-qualification application and obtaining approval after January 1 of each year. The City will accept the approval of qualifications granted from the Department of Transportation and the Department of Administrative Services, including the time periods used by those agencies.

10. BID BOND, PUBLIC WORKS BOND, PAYMENT BOND AND PERFORMANCE BOND

A Bid Bond, Public Works Bond Filing Certification, Payment Bond and Performance Bond shall be provided as specified in Subsection 5.4 of the General Conditions. No waivers, special requirements or emergency provisions have been established for this Contract.

11. PAY EQUITY COMPLIANCE CERTIFICATION (NEW)

ORS 279A.167 requires businesses with fifty (50) or more employees, and a contract valued at more than $500,000, to provide proof they are properly trained on Oregon's pay equity laws. A certificate proving the contractor has completed the training shall be provided as specified in Subsection 26 of the "Bid Form".

12. HIGHEST STANDARDS OF WORK AND CONSEQUENCES FOR FAILURE

The work to be performed must meet the highest standards prevalent in the industry or business most closely related to the work to be performed. Failure to meet such standards may result in consequences including, but not limited to a reduction or withholding of payment; a requirement that bidder perform, at bidder's own expense, additional work required to meet such standards; or termination of the contract, with damages being sought.

13. CONDITIONS OF WORK

Bidders must make their own determination of the nature of the work proposed under this Contract, the local conditions which can be encountered in this area, and all other matters which can in any way affect the work proposed under this Contract. It shall also be the bidder's responsibility to be thoroughly familiar with the Contract Documents. Failure to make the examination necessary for this determination or to examine any form, instrument or document of the Contract shall not release the bidder from the obligations of this Contract.

14. REVIEW OF BIDS; BASIS FOR AWARD; NOTICE OF INTENT TO AWARD; AND RIGHT TO PROTEST AWARD

In reviewing all bids received and determining the lowest responsible bidder, the City reserves the right to take into account and give reasonable weight to the extent of the

bidder's experience on work of the nature involved, on the bidder's record as to dependability in carrying out of contracts, and evidence of present ability to perform the Contract in a satisfactory manner.

The City may make such investigations as deemed necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the City all such information and data for this purpose as the City may request. The City reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the City that such bidder is properly qualified to carry out the obligations of the Contract, to complete the work contemplated therein, and to do so in a timely manner. The City specifically reserves the right to reject a bid from a bidder who, at the time bids are opened, has failed to complete work in a timely manner under a contract previously awarded to the bidder by the City. Conditional bids will not be accepted.

In accordance with ORS 279A.120(2)(b), in determining the lowest responsible bidder, the City shall, for the purpose of awarding the Contract, add a percentage increase on the bid of a non-resident bidder equal to the percent, if any, of the preference given to that bidder in the state in which the bidder resides.

Within forty-five (45) calendar days after the bid opening, the City will accept one of the bids or reject all of the bids received. If the City intends to accept one of the bids, it shall issue a Notice of Intent to Award the Contract to all bidders. The City's award will not be final until seven (7) calendar days after the date of the notice if no protest is filed; or if a protest is filed, until the City provides a written response to all timely-filed protests that denies the protest and affirms the award.

A bidder may submit a formal written protest to the City's Notice of Intent to Award the Contract within seven (7) calendar days of the date of the City's Notice of Intent. The written protest must specify the grounds upon which the protest is based and must show that the protesting party is an adversely affected or aggrieved bidder. A bidder is adversely affected or aggrieved only if the bidder is eligible for award of the Contract as the responsible bidder submitting the lowest responsible bid, is next in line for award and claims that all lower bidders are ineligible for award in accordance with law.

Such protest must be submitted to the City Recorder, 900 SE Douglas, Roseburg, OR 97470 or by email at info@cityofroseburg.org. Any protest received after the 7-day deadline will not be considered. The City Recorder shall forward such protest to the City Manager who shall have the authority to settle or resolve the protest by written decision.

15. EXECUTION OF CONTRACT, BONDS AND DAMAGES FOR FAILURE TO EXECUTE

The bidder whose bid is accepted will be required to appear within ten (10) calendar days after notice that the Contract has been awarded to bidder and to execute the Contract with the City for the full and complete performance of all work specified, and as required by Subsection 5.4 of the General Conditions, deliver the Public Works Bond Filing Certification form, the Payment Bond to assure payment of the obligations incurred in the performance of the Contract and the Performance Bond and to ensure performance of the Contract.

Should the successful bidder fail or refuse to execute the Contract and furnish the Public Works Bond Filing Certification form, Payment Bond and/or Performance Bond when required, then the Bid Bond deposited by said bidder shall be retained by the City as liquidated damages.

16. COMMENCEMENT DATE AND EXPIRATION DATE OF CONTRACT

This Contract shall be in effect from the time the Contract is signed until the Project is completed. The Contractor must be capable of commencing construction on the work contemplated in the Contract Documents within ten (10) calendar days after the execution of the Contract and receipt of the City's notification to proceed and shall complete the same within the time specified in the bid.

17. DURATION OF BIDS; RETURN OF BID BONDS

All bids will be binding until the later of:

1) the day the contract is executed; or
2) sixty (60) calendar days after the date of bid opening.

Bid bonds will be returned to unsuccessful bidders not later than the date on which the bids are no longer binding.

18. PUBLIC RECORDS

These Contract Documents and each bid received in response to it, together with copies of documents pertaining to the award of a contract shall be kept on file as a public record by the City Recorder; provided however, such records shall not be disclosed until after the notice of intent to award the contract has been issued.

19. RECORDS REVIEW; CONFIDENTIALITY

After notice of intent to award the resulting contract has been issued, all bids shall be available for public inspection except for those portions of a bid that the bidder designates in its bid as trade secrets or as confidential proprietary data in accordance with applicable state law. If the City determines such designation is not in accordance with applicable law, the City shall make those portions available for public inspection. The bidder shall separate information designated as confidential from other non-confidential information at the time of submitting its proposal. Prices, makes, models or catalog numbers of items offered, scheduled delivery dates and terms of payment are not confidential, and shall be publicly available regardless of a bidder’s designation to the contrary.

20. MATERIALS CONTAINING ASBESTOS

Materials containing asbestos may be present in underground pipe systems. All appropriate Federal, State, County and Municipal rules, regulations and guidelines must be followed when working with asbestos containing material. Non friable material must

be handled, transported and disposed of in a way that prevents it from becoming friable and releasing asbestos fibers. If AC pipe is shattered, damaged or badly weathered, it is considered to be friable and will likely release asbestos fibers. A DEQ licensed asbestos abatement contractor using DEQ certified workers must remove all friable asbestos material. Any and all permits and fees that are required by the DEQ, Douglas County and any other regulatory agency must be obtained and paid for by the Contractor prior to disposing of the asbestos containing material. For information about asbestos rules, contact the DEQ Western Region office in Medford, Oregon.

BIDDER'S CHECK LIST

Bidder's attention is called to the following forms, which must be executed in full as required with the bid:

A. **BID FORM(S):** Each bidder shall complete the bid form(s). Prices must be shown in the spaces provided and must be expressed in figures.

B. **BID BOND:** This form is to be executed by bidder and bidder's Surety. The amount of cash, certified check, cashier's check, irrevocable letter of credit or Bid Bond shall not be less than 10% of the total Bid amount.

C. **FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM:** When required by law, this form must be submitted by the bid submission deadline, at which time bids will be opened and read, or within two (2) working hours of such submission deadline. If no subcontractors for labor or for labor and materials will be used, the bidder must write "NONE" on the disclosure form, sign and submit the form as required. Failure to submit this form within two hours of the bid submission deadline will result in the bid becoming non-responsive and such bid will be returned to the bidder.

D. **DRUG TESTING PROGRAM CERTIFICATION FORM:** This form must be submitted with the bid to demonstrate that bidder has an employee drug and alcohol testing program in place and will continue to keep the program in place throughout the duration of performing the Contract awarded.

E. **PUBLIC WORKS BOND PRE-BID NOTICE & CERTIFICATION FORM:** This form must be submitted with the bid to demonstrate contractor's awareness of and intended compliance with the requirement to file a Public Works Bond with the Construction Contractors Board prior to beginning work on the project if awarded the bid.

F. **PAY EQUITY COMPLIANCE CERTIFICATION FORM (NEW): If applicable pursuant to Section 11 of "Information for Bidders",** this form must be submitted with the bid to demonstrate contractor has completed required training regarding pay equity and the prohibition against discrimination in compensation or wage benefits.

The following forms are to be executed after the Contract is awarded, prior to beginning work on the project:

A. **CONSTRUCTION CONTRACT:** This agreement is to be executed by the successful bidder.

B. **PERFORMANCE BOND AND PAYMENT BOND:** Both a Performance Bond and a Payment Bond are to be executed by the successful bidder and bidder's Surety Company and submitted at the time the Contract is executed.

C. **PUBLIC WORKS WAGE CERTIFICATION FORM:** This form is to be completed in accordance with state law and submitted monthly during the duration of the contract, by the fifth business day of the following month, with request for payment.

D. **CERTIFICATE OF INSURANCE:** This certificate is to be executed by the successful bidder and bidder's insurance company and submitted at the time the Contract is executed.

E. **PUBLIC WORKS BOND FILING CERTIFICATION:** This form is to be executed by the successful bidder and submitted at the time the Contract is executed to certify if

Contractor has filed the required Public Works Bond or elected not to file the Bond due to qualifying under ORS 200.055.

BID FORM

City of Roseburg
900 SE Douglas Avenue
Roseburg, Oregon 97470

The undersigned bidder has carefully examined the Contract Documents for the construction of the

WATER TREATMENT PLANT STANDBY GENERATOR
PROJECT No. 20WA03

referred to in the Invitation to Bid dated _____, inviting bids on such Project and also the site of the Project. Bidder will provide all necessary labor, equipment, tools, apparatus and other means of construction, do all the work and furnish all the materials called for by said Contract Documents in the manner prescribed therein to provide a complete Project.

The undersigned bidder understands that the quantities of work as shown herein are approximate only, unless noted otherwise, and are subject to increase or decrease. The bidder offers to perform the work, at the unit price stated in the following schedule, whether the quantities are increased or decreased.

Deductive Bids: The City of Roseburg reserves the right to Award the Contract to the lowest responsible, responsive bidder whose Proposal is in the best interest of the Owner. Contract award will be based on the total construction cost for the Base Bid plus any Deductive Bid Schedules. The City reserves the right to accept bids on the entire project or reduce the size by eliminating deductibles for budgetary reasons. If project size must be reduced for budgetary reasons, the City will eliminate the deductibles in the following order:

1. Deductive Bid Schedule B.
2. Deductive Bid Schedule C.

Water Treatment Plant Standby Generator Schedule A Base Bid Project Number: 20WA03					
Item No.	**Description**	**Unit***	**Estimated Quantity**	**Unit Price (in figures)**	**Estimated Total Price (in figures)**
1	Mobilization, Demobilization, Site Preparation, and Cleanup	LS	1	$	$
2	Site Work	LS	1	$	$
3	Earthwork	LS	1	$	$
4	Unscheduled Excavation	TONS		$	$
5	Unscheduled Backfill	CY		$	$
6	Structural	LS	1	$	$
7	Electrical	LS	1	$	$
8	Automatic Control	LS	1	$	$
Schedule A Base Bid Total:				**$**	

Water Treatment Plant Standby Generator Deductive Bid Schedule B Project Number: 20WA03					
Item No.	**Description**	**Unit***	**Estimated Quantity**	**Unit Price (in figures)**	**Estimated Total Price (in figures)**
1	One (1) Portable Trailer Mounted Generator	LS	1	$	$
Schedule B Deductive Bid Total:				**$**	

Water Treatment Plant Standby Generator Deductive Bid Schedule C Project Number: 20WA03					
Item No.	**Description**	**Unit***	**Estimated Quantity**	**Unit Price (in figures)**	**Estimated Total Price (in figures)**
1	One (1) Additional Portable Trailer Mounted Generator	LS	1	$	$
Schedule C Deductive Bid Total:				**$**	

Water Treatment Plant Standby Generator Total Amount (Bid Schedules A, B, and C Combined) Project Number: 20WA03	
Total Amount Bid (Schedule's A, B, and C):	**$**

*Abbreviations ***(Add other abbreviations as required for the project***):

LS – Lump Sum CY – Cubic Yard EA – Each

LBS – Pounds LF – Lineal Feet IN – Inches

SY – Square Yard TONS – Tons

BIDS WILL BE EVALUATED ON THE SCHEDULE "A" BASE BID PRICE PLUS ANY OR ALL OF THE SCHEDULES CHOSEN BY THE OWNER. THE ORDER OF THE SCHEDULES LISTED ABOVE DOES NOT REPRESENT THE ORDER IN WHICH ANY OF THESE SCHEDULES MAY BE CHOSEN.

The undersigned also declares and agrees as follows:

1. That the only persons or parties interested in this bid are those named herein, that the bid is in all respects fair and without fraud, and that it is made without any connection or collusion with any person making another bid on this Contract.

2. That the bidder, and any subcontractor upon which the bidder is relying, have carefully examined and had an opportunity to comment on, the Contract Documents for the

construction of the proposed improvements including a full set of the plans and specifications, including all addenda thereto; that bidder has personally inspected the contemplated construction area or areas; that bidder is satisfied as to the adequacy and completeness of the plans and specifications, the feasibility of the work described therein, quantities of materials, items of equipment and conditions of work involved, including the fact that the description of work and materials as included herein are approximate only; and that this bid is made according to the provisions and under the terms of the Specifications which are hereto attached and hereby made a part of this bid.

3. All of the Specifications and Plans which are listed herein have been examined by the undersigned bidder and the terms and conditions thereof are hereby accepted.

4. It is understood that the Plans may be supplemented by additional Drawings and Specifications in explanation and elaboration of the Plans and it is agreed that such Supplemental Drawings, when not in conflict with those referred to in Paragraph 3 above, will have the same force and effect as if completed and attached hereto, and that when received, will be considered a part of the Contract Documents.

5. It is understood that all work will be performed under the price schedule outlined herein and that all services, materials, labor and equipment and all work necessary to complete the Project in accordance with the Plans and Specifications shall be furnished for the prices named in the bid. If there is a change in the scope of work or work which cannot be properly classified under the price schedule then bidder agrees to do this work as "extra work". The undersigned bidder agrees to do any extra work and furnish materials, and to accept as full compensation therefore at such prices as may be agreed upon in writing by the City and the Contractor before extra work begins. Each party binds itself to agree to reasonable prices.

6. It is understood that the Owner reserves the right to Award the Contract to the lowest responsible, responsive bidder whose Proposal is in the best interest of the Owner. Bidders shall submit an overall bid for the project, specifying separately the cost of each Deductible (Schedule B and Schedule C). The City reserves the right to accept bids on the entire project, or reduce the size by eliminating deductibles for budgetary reasons. If project size must be reduced for budgetary reasons, the City will eliminate the deductibles in the following order: 1. Deductive Bid Schedule B; 2. Deductive Bid Schedule C.

7. It is understood the work to be performed must meet the highest standards prevalent in the industry or business most closely related to the work to be performed. It is further understood that failure to meet such standards may result in consequences including, but not limited to, a reduction or withholding of payment; a requirement that bidder perform, at bidder's own expense, additional work required to meet such standards; or termination of the contract, with damages being sought.

8. The bidder agrees that if this bid is accepted, the bidder will, within ten (10) calendar days after the notification of acceptance, execute the Construction Contract with the City in the form of Contract specified, and will, at the time of execution of the Contract, deliver to the City the Performance Bond, Payment Bond and Public Works Bond Filing

Certification form as required herein, and will furnish all the materials necessary to complete the Project in the manner, in the time and according to methods as specified in the Specifications and required by the City.

9. The cash, certified check, cashier's check, irrevocable letter of credit or Bid Bond shall be payable to the City to the extent of 10% of the amount of the bid in case this bid is accepted by the City and the undersigned shall fail or refuse to execute the Contract and furnish a Payment Bond, a Performance Bond or the Public Works Bond Filing Certification form as required by the Specifications within the time limit named therein after notification that said bid is accepted, all in accordance with the provisions of this bid and the Plans and Specifications which are a part hereof.

10. All items for the Contract for which forms are provided herein have been completed in full by the showing of prices for each and every item thereof, and for the showing of other information indicated by the Bid Form.

11. Bidder agrees to begin work within ten (10) calendar days after the execution of the Contract proposed herein and receipt of the City's notification to begin work and to complete work in all respects within *(two hundred and fifty) (250)* calendar days after "Notice to Proceed" has been issued by the City.

12. In the event the bidder is awarded the Contract and fails to complete the Project within the time limit or extended time agreed upon, as more specifically set forth in the General Conditions, liquidated damages shall be paid to or withheld by the City pursuant to Paragraph 4 of the Construction Contract (Time of Performance - Liquidated Damages) at the rate of **one thousand dollars ($1,000.00)** per day, until the Project has been completed as provided in the General Conditions.

13. The undersigned bidder hereby states, as part of this bid, that the applicable provisions of Oregon's Prevailing Wage Law (ORS 279C.800 to 279C.870) and the Federal Prevailing Wage Law (Davis-Bacon Act, 40 U.S.C. 3141-3148), shall be complied with. When the Project is subject to both the State and Federal Prevailing Wage Laws and rates, workers in each trade will be paid the higher of the two rates.

14. The undersigned bidder and bidder's subcontractors shall comply with ORS 656.017, which requires them to provide Workers' Compensation coverage for all their subject workers.

15. The undersigned bidder hereby states, as part of this bid, that bidder shall comply with ORS 279C.505(2) which requires bidder to have an employee drug testing program in place.

16. The undersigned bidder and bidders' subcontractors shall comply with ORS 279C.570 and 279C.580, which require timely progress payments for public improvement projects and provide interest penalties for late payment.

17. The undersigned bidder hereby states, as part of this bid, bidder and bidder's subcontractors shall comply with the provisions of Exhibit "A" - "Standard City Contract Provisions".

18. If the bidder is awarded the Contract for this work, the name and address of the Surety who will provide the Payment Bond, Performance Bond and Public Works Bond (if required) will be:_____.

19. The name and address of the bidder who is submitting this bid is: _____, which is the address to which all communications pertinent to this bid and the Contract shall be sent. The bidder's email address is:_____.

20. The names of the principal officers of the corporation submitting this bid or of the partnership, or of all parties interested in this bid as principals are as follows: _____.

21. The undersigned bidder acknowledges that Addenda No. _____ through _____ have been delivered to bidder and have been examined as part of the Contract Documents.

22. In the prosecution of this work, the bidder proposes to use the subcontractors listed on the First-Tier Subcontractor Disclosure Form presented within two working hours of the bid submission deadline as set forth in the Invitation to Bid. Any bidder not using subcontractors subject to the above referenced Disclosure Form shall indicate "NONE" on the Disclosure Form and sign and submit the form as required.

23. Declaration of Residency: I "am" or "am not" (circle one) a "resident bidder"* as defined by ORS 279A.120, a contractor that has paid unemployment taxes or income taxes in Oregon during the 12 calendar months immediately preceding submission of the bid, has a business address in this state and has stated in the bid whether the bidder is a "resident bidder" pursuant to ORS 279A.120.

24. The bidder's Construction Contractors Board License Number or Landscape Contractors Board License Number is: _____.

25. Bidder's Tax Identification Number: _____. Email:_____.

26. Public Works Bond: If the bid is accepted, prior to beginning work on the project, the bidder will file with the Construction Contractors Board, a Public Works Bond in the amount of $30,000 with a corporate surety authorized to do business in the State of Oregon; and before permitting a subcontractor to begin work on the project, the bidder will verify that the subcontractor has also filed the aforementioned bond. If the bidder, as a certified disadvantaged, minority, women or emerging small business enterprise, elects not to file the Public Works Bond, bidder will file written verification of such certification with the Construction Contractors Board and provide the Board and the City of Roseburg with notice of such election.

27. **If applicable** pursuant to Section 11 of "Information for Bidders", the undersigned bidder hereby states, as part of this bid, that bidder has completed pay equity compliance training and received a certificate of completion from the Oregon Department of Administrative Services. **(NEW)**

<u>If sole Proprietor or Partnership</u>:

In witness hereto, the undersigned as set his/her hand this _____ day of _____, 2021.

Printed name of bidder:_____

Signature of bidder:

_____

Title:_____

<u>If Corporation</u>:

In witness whereof, the undersigned corporation has caused this instrument to be executed and its seal affixed by its duly authorized officers this ____ day of _____, 2021.

Name of Corporation:_____

Printed name of person signing:_____

Signature:_____

Title:_____

Attest: _____
Secretary

STANDARD BID BOND

We, _____, "as Principal,"
(Name of Principal)
and _____, an _____Corporation,
(Name of Surety)

authorized to transact Surety business in Oregon, as "Surety," hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns to pay unto the City of Roseburg ("Obligee") the sum of ($_____) _____ dollars.

WHEREAS, the condition of the obligation of this bond is that Principal has submitted its proposal or bid to an agency of the Obligee in response to Obligee's procurement document (No. _____) for the project identified as:
_____ which proposal or bid is made a part of this bond by reference, and Principal is required to furnish bid security in an amount equal to ten percent (10%) of the total amount of the bid pursuant to the procurement document and ORS 279C.365(5) for competitive bidding or 279C.400(5) for competitive proposals.

NOW, THEREFORE, if the proposal or bid submitted by Principal is accepted, and if a contract pursuant to the proposal or bid is awarded to Principal, and if Principal enters into and executes such contract within the time specified in the procurement document and executes and delivers to Obligee its good and sufficient performance bond, payment bond and public works bond as required by Obligee within the time fixed by Obligee, then this obligation shall be void; otherwise, it shall remain in full force and effect.

IN WITNESS WHEREOF, we have caused this instrument to be executed and sealed by our duly authorized legal representatives this _____ day of _____, 2021.

PRINCIPAL: _____ SURETY: _____

By _____ BY ATTORNEY-IN-FACT:
Signature

_____ _____
Official Capacity Name

Attest: _____ _____
Corporation Secretary Signature

_____
Address

_____
City State Zip

_____
Phone Email

FIRST TIER SUBCONTRACTOR DISCLOSURE FORM INSTRUCTIONS

Instructions for First-Tier Subcontractor Disclosure:

Bidders are required to disclose information regarding certain first-tier subcontracts (ORS 279C.370). Specifically, when the contract amount of a first-tier subcontract furnishing labor or labor and materials would be great than or equal to: (1) 5% of the project bid, but at least $15,000; or (2) $350,000 regardless of the percentage, the bidder must disclose the following information about that subcontract either in its bids submission, or within two hours after bid closing:

(A) The subcontractor's name;

(B) The category of work that the subcontractor would be performing; and

(C) The dollar value of the subcontract.

If the bidder will not be using any subcontractors that are subject to the above disclosure requirements, the bidder is required to indicate "NONE" on the accompanying form.

THE CONTRACTING AGENCY MUST REJECT A BID IF THE BIDDER FAILS TO SUBMIT THE DISCLOSURE FORM WITH THIS INFORMATION BY THE STATED DEADLINE (OAR 137-049-0360).

**** The subject form is on the following page.***

FIRST TIER SUBCONTRACTOR DISCLOSURE FORM

PROJECT NAME: _____

BID#: _____

BID CLOSING: DATE: _____ **TIME:** _____

This form must be submitted at the location or email specified in the Invitation to Bid on the advertised bid closing date and within two working hours after the advertised bid closing time.

List below: the name of each subcontractor that will be furnishing labor or labor and materials and is required to be disclosed, the category of work that the subcontractor will be performing and the dollar value of the subcontract. Enter "NONE" if there are no subcontractors that need to be disclosed. (ATTACH ADDITIONAL SHEETS IF NEEDED)

NAME OF SUBCONTRACTOR	DOLLAR VALUE	CATEGORY OF WORK
_____	$ _____	_____
_____	$ _____	_____
_____	$ _____	_____
_____	$ _____	_____
_____	$ _____	_____
_____	$ _____	_____

Failure to submit this form by the disclosure deadline will result in a nonresponsive bid. A nonresponsive bid will not be considered for award.

Form submitted by (bidder name):_____

Contact name:_____ **Phone #:**_____

****

Form Received in the City Recorder's Office:

Time: _____ **Date:** _____ **By:** _____

EMPLOYEE DRUG TESTING PROGRAM
CERTIFICATION FORM

BIDDER'S NAME:_____

PROJECT NAME & NUMBER:_____

ORS 279C.505 (2) provides that every public improvement contract contain a condition that the Contractor shall demonstrate that an employee drug testing program is in place. The City's award of the Contract for which this certificate is required is conditioned, in part, upon the Bidder's demonstration of compliance with the provisions of ORS 279C.505(2). If the Bidder named above is awarded the Contract, this certificate shall become a part of, and shall constitute a continuing representation and warranty under, the Contract.

To induce the City to award the Contract to the Bidder, the undersigned, as the duly authorized representative of the Bidder, hereby represents and warrants, on behalf of the above named Bidder:

1. That Bidder has and enforces, and at all times during the term of the Contract will have and enforce, a written employee drug testing policy that at a minimum, requires compliance with the Oregon Department of Transportation Commercial Drivers License drug testing regulations;

2. A copy of the Bidder's current written employee drug testing policy will be available for inspection by the City at any time upon the City's request; and

3. The Bidder understands and agrees that its representations and warranties herein will become a continuing part of the Contract and that breach of any of the foregoing will be sufficient grounds for disqualification under 279C.440(2)(d).

The City shall not be liable, either directly or indirectly, in any dispute arising out of the substance or procedure of Bidder/Contractor's drug testing program. Nothing in this drug testing provision shall be construed as requiring Bidder/Contractor to violate any legal, including constitutional rights of any employee, including but not limited to, selection of which employees to test and the manner of such testing. The City shall not be liable for Bidder/Contractor's negligence in establishing or implementing, or failure to establish or implement, a drug testing policy, or for any damage or injury caused by Bidder/Contractor's employees acting under the influence of drugs while performing work covered by the Contract. These are Bidder/Contractor's sole responsibilities.

In Witness whereof, the Bidder has caused this document to be executed by its duly authorized representative on the date shown below.

Signature:_____

Printed Name, Title:_____

Date:_____

PAY EQUITY COMPLIANCE TRAINING
CERTIFICATION FORM
(NEW)

BIDDER'S NAME:_____

PROJECT NAME & NUMBER:_____

ORS 279A.167(1) provides that the Oregon Department of Administrative Services shall establish a program to certify that a person that intends to submit a bid or proposal for a public contract understands the prohibition set forth in ORS 652.220 and in other laws or rules that prohibit discrimination in compensation or wage payments. Following completion of the course, a certificate of completion will be provided. This certification is recommended for ANY contractor in the state of Oregon, and **required for any contractor who employs fifty (50) or more people, and for a contract valued at more than $500,000**. Information on how to receive this certification can be found by clicking here.

To induce the City to award the Contract to the Bidder when the certification is required, the undersigned, as the duly authorized representative of the Bidder, hereby represents and warrants, on behalf of the above named Bidder:

1. That Bidder has completed the training on pay equity as outlined in ORS 652.220; and

2. A copy of the Certificate of Completion of the pay equity compliance training will be available for inspection by the City at any time upon the City's request.

In Witness whereof, the Bidder has caused this document to be executed by its duly authorized representative on the date shown below.

Signature:_____

Printed Name, Title:_____

Date:_____

CITY OF ROSEBURG
PUBLIC WORKS BOND - PRE-BID NOTICE AND CERTIFICATION

I, the undersigned contractor, hereby certify that if awarded the contract for which I am submitting this bid, prior to beginning work on such Project, unless exempt under ORS 279C.800 to 279C.870, I will file with the Construction Contractors Board, a Public Works Bond in the amount of $30,000 with a corporate surety authorized to do business in the State of Oregon. I further certify that before permitting a subcontractor to start work on the Project upon which I am submitting this bid, I will verify that the subcontractor has also filed such Public Works Bond or has elected not to file such bond as allowed by state law. The Public Works Bond shall provide that the contractor or subcontractor will pay claims ordered by the Bureau of Labor and Industries to workers performing labor upon public works projects. The bond shall be a continuing obligation and remain continuously in effect.

If, as a contractor, I qualify as a disadvantaged, minority, women, disable veteran or emerging small business enterprise certified under ORS 200.055 and I have elected not to file the aforementioned Public Works Bond, I hereby certify that I will file written verification of such certification with the Construction Contractors Board. I also certify that before beginning any work on the Project, I will provide the City of Roseburg and the Construction Contractors Board written notice that I have elected not to file the Public Works Bond. If so certified under ORS 200.055, I understand that my election not to file the Public Works Bond will expire one year from the date it was filed and that a claim for unpaid wages may be filed against the payment bond I submitted on the Project.

I further certify that I understand the Public Works Bond described above is in addition to any other bond that I am required to provide, or that may be required of a subcontractor, for this Project.

Project Name:_____

Project Number:_____

Contractor's Printed Name:_____

Contractor's Signature:_____

Dated:_____

CITY OF ROSEBURG
CONSTRUCTION CONTRACT
[PROJECT #20WA03]

Dated: _____

Parties: City of Roseburg ("CITY")
A municipal corporation in the State of Oregon
900 SE Douglas Avenue
Roseburg, OR 97470

and

[Name of Company] ("CONTRACTOR")

Additional Independent Contractor Information:

A. Type of Entity: ☐ Sole Proprietorship ☐ Partnership ☐ Limited Liability Company ☐ Corporation
B. Address:
C. Telephone:
D. Fax No:
E. Email:
F. Construction Contractor Board No.

This Contract is made and entered into this _____ day of _____, 2021, by and between _____hereinafter called the "Contractor", and the City of Roseburg, a municipal corporation of the State of Oregon, hereinafter called the "City".

WITNESSETH

That the Contractor and City, for the consideration hereinafter described agree as follows:

1. WORK TO BE PERFORMED. The Contractor agrees to do all the work and furnish all necessary labor, materials, tools and equipment for the completion of the **Water Treatment Plant Standby Generator** in accordance with the bid made by the Contractor on the ____ day of _____, 2021, all in full compliance with the Contract Documents referred to herein, and guarantees all materials and workmanship for one year after acceptance of the project.

2. CONTRACT DOCUMENTS. The Contract Documents include the City's Invitation to Bid, Information to Bidders, the Bid Form signed by the Contractor, this Construction Contract with Exhibit A, First-Tier Subcontractor Disclosure Form, Drug Testing Program Certification Form, Bidder's Responsibility Form, Performance Bond, Payment Bond, Public Works Bond Filing Certification form (when required), General Conditions, Technical Provisions, Special Conditions, Standard Drawings, Specifications and Plans and Supplemental Specifications, all as required for the full execution and satisfactory completion of the work. All of the Contract Documents are incorporated herein by this reference and made a part of this Contract.

3. PAYMENT. In consideration of the faithful performance of the work herein described, the City agrees to pay the Contractor **(insert cost/bid amount)** as payment in full per the provisions of the Contract Documents.

4. TIME OF PERFORMANCE - LIQUIDATED DAMAGES. The Contractor shall commence work under this Contract upon receiving notification to proceed from the City. The Contractor agrees that the work under this Contract shall be completed within Two Hundred and Fifty (250) calendar days after notification to begin work. If the Contractor fails to complete the Project within the time hereinbefore mentioned, or in the extended time agreed upon, liquidated damages shall be paid to or withheld by the City at the rate of **one thousand dollars ($1,000.00)** per day until the Project is completed. It has been agreed that the damages arising from a delay in completion would be difficult to ascertain with any degree of accuracy, even after the Project is completed. It has also been agreed that the amount of liquidated damages specified herein is a reasonable forecast of just compensation for the harm that will be caused by a delay in completion of the Project. Any such sum which the Contractor may be obligated to pay under the terms of this Paragraph is paid as liquidated damages, and not as a penalty.

5. COMPLIANCE WITH LAW. The Contractor shall comply with all local, state and federal laws, ordinances and regulations applicable to contracts covering municipal contracts, and shall make prompt payment of all amounts that may be due from said Contractor in the way of taxes, other governmental charges or lawful deductions, and shall make prompt payment of all labor and materials and shall save the City harmless from any damages or claims whatsoever in the performance of the Contract. Contractor and all subcontractors agree to comply with the City's Standard Contract Provisions, attached as Exhibit A and incorporated herein by this reference, and Roseburg Municipal Code Regulations relating to business registration.

6. NOTICE. Any notice required or permitted by this Contract must be delivered and served personally, or alternatively, deposited in the United States mail, postage prepaid, registered or certified, return receipt requested, addressed to the parties as shown below:

CITY:	**CONTRACTOR:**
City of Roseburg	_____
ATTN: City Manager	_____
900 SE Douglas Avenue	_____
Roseburg OR 97470	_____

Such notice, if mailed within the State of Oregon, shall be deemed delivered upon the second day following the date postmarked. If mailed outside the State of Oregon, notice shall be deemed delivered upon the fifth day following the date postmarked.

7. GOVERNING LAW; VENUE LOCATION. Oregon law shall be applied to all actions relating to the Contract, and the venue in any such action shall lie in the Circuit Court of Douglas County, Oregon.

IN WITNESS WHEREOF, the parties hereto have executed this Contract the day and year first above written.

CITY

_____

Nicole Messenger
City Manager

Date:_____

ATTEST:

_____

Amy L. Sowa, ACM/City Recorder

CONTRACTOR

_____

(Authorized Signature)
Title:_____

Date:_____

_____

Tax Identification Number

Email:_____

EXHIBIT "A"
STANDARD CONTRACT PROVISIONS
PREVAILING WAGE CONTRACT
(ORS 279C.800 - 279C.870)

The following provisions, if applicable, are hereby included in and made a part of the attached public contract which is subject to Prevailing Wage Laws and rates, between the City of Roseburg and the Contractor named therein as provided for in the Roseburg Code, Oregon Revised Statutes, and Federal laws, rules, regulations, and guidelines. If a Contractor or Subcontractor violates the provisions below, the City may, at its option, terminate the contract or a subcontract and said Contractor or Subcontractor in such event shall forfeit all rights under the contract except to payment for actual labor and materials furnished to the City. The City may waive in whole or in part any forfeitures or sanctions provided in this Exhibit.

1. PREFERENCE FOR OREGON GOODS AND SERVICES; NONRESIDENT CONTRACTOR REPORT TO DEPARTMENT OF REVENUE - ORS 279A.120:

1.1 For purposes of awarding the contract the City will:

1.1.1 give preference to goods and services that have been manufactured or produced in Oregon if the price, fitness, availability and quality are otherwise equal; and

1.1.2 add a percentage increase to the bid of a non-resident bidder equal to the percentage, if any, of the preference given to the contractor in the same state in which the contractor lives.

1.2 As used in this Section:

1.2.1 "nonresident contractor" means a contractor that is not a resident contractor;

1.2.2 "resident contractor" means a contractor that has paid unemployment taxes or income taxes in the state of Oregon during the twelve (12) calendar months immediately preceding submission of the bid for the contract; has a business address in this state; and stated in the bid for the contract that it was not a "resident bidder" under ORS 279A.120.

1.3 If the Contractor is a nonresident contractor and the contract price exceeds $10,000, the Contractor shall promptly report to the Department of Revenue on forms to be provided by the Department, the total contract price, terms of payment, length of contract and such other information as the Department may require before the Contractor may receive final payment on the public contract. The City shall satisfy itself that the requirement of this Subsection has been complied with before it issues a final payment on the contract.

2. PAYMENT OF LABORERS AND MATERIALMEN, CONTRIBUTIONS TO INDUSTRIAL ACCIDENT FUND, LIENS, AND WITHHOLDING TAXES - ORS 279C.505(1):
The Contractor shall:

2.1 Make payment promptly, as due, to all persons supplying to such Contractor, labor or material for the performance of the work provided for in the contract.

2.2 Pay all contributions or amounts due the Industrial Accident Fund from such Contractor or Subcontractor incurred in the performance of the contract.

2.3 Not permit any lien or claim to be filed or prosecuted against the City of Roseburg or any subdivision thereof on account of any labor or material furnished.

2.4 Pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.

3. PAYMENT OF CLAIMS BY PUBLIC OFFICERS - ORS 279C.515:

3.1 If the Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to the Contractor or a Subcontractor by any person in connection with the contract as such claim becomes due, the public officer or officers representing the City of Roseburg may pay such claims to the person furnishing the labor or services and charge the amount of the payment against funds due or to become due the Contractor by reason of the contract. The payment of a claim in the manner authorized shall not relieve the Contractor or his/her surety from his or her obligations with respect to any unpaid claims.

3.2 If the Contractor or a first-tier Subcontractor fails, neglects or refuses to make payment to a person furnishing labor or materials in connection with the contract within thirty (30) days after receipt of payment from the City of Roseburg or the Contractor, the Contractor or first-tier Subcontractor shall owe the person the amount due plus interest charges commencing at the end of the 10-day period that payment is due under ORS 279C.580(4) and ending upon final payment, unless payment is subject to a good faith dispute as defined in ORS 279C.580. The rate of interest charged to the Contractor or first-tier Subcontractor on the amount due shall equal three times the discount rate on 90-day commercial paper in effect at the Federal Reserve Bank in the Federal Reserve District that includes Oregon on the date that is thirty (30) calendar days after the date when payment was received from the City of Roseburg or from the Contractor, but the rate of interest shall not exceed 30 percent. The amount of interest may not be waived.

3.3 If the Contractor or Subcontractor fails, neglects or refuses to make payment to a person furnishing labor or materials in connection with the contract, the person may file a complaint with the Construction Contractors Board, unless payment is subject to a good faith dispute as defined in ORS 279C.580. The Contractor shall announce the foregoing in any Subcontract issued.

4. HOURS OF LABOR - ORS 279C.520: No person shall be employed for more than 10 hours in any one day, or 40 hours in any one week, except in cases of necessity, emergency, or when the public policy absolutely requires it, and in such cases the employee shall be paid at time and a half pay:

4.1 For all overtime worked in excess of 8 hours a day or 40 hours in any one week, when the work week is five consecutive days, Monday through Friday; or

4.2 For all overtime in excess of 10 hours a day or 40 hours in any one week when the work week is four consecutive days, Monday through Friday; and

4.3 For all work performed on Saturday and on any legal holiday specified in ORS 279C.540, or all holidays specified in a collective bargaining agreement.

The Contractor must give notice to employees who perform work on the contract, in writing, either at the time of hire or before commencement of work on the contract, or by posting a notice in a location frequented by employees, the number of hours per day and days per week that the employees may be required to work.

5. PAYMENT FOR MEDICAL CARE AND ATTENTION TO EMPLOYEES - ORS 279C.530:

5.1 The Contractor shall promptly as due, make payment to any person, co-partnership or association or corporation furnishing medical, surgical, and hospital care or other needed care and attention, incident to sickness or injury, to the employees of such Contractor, of all sums which the Contractor agrees to pay for such services and all monies and sums which the Contractor collected or deducted from the wages of employees pursuant to any law, contract or agreement for the purpose of providing or paying for such service.

5.2 The Contractor, its subcontractors, if any, and all employers providing work, labor or materials under this Contract who are subject employers under the Oregon Workers' Compensation Law shall comply with ORS 656.017, which requires them to provide workers' compensation coverage that satisfies Oregon law for all their subject workers. Out-of-state employers must provide workers' compensation coverage that complies with ORS 656.126 for their workers. Employer's Liability Insurance with coverage of not less than $500,000 each accident shall be included.

6. PAYMENT TO SUBCONTRACTORS - ORS 279C.580:

6.1 The Contractor shall include in each subcontract for property or services entered into by the Contractor and a first-tier Subcontractor, including a material supplier, for the purpose of performing the public contract:

6.1.1 A payment clause that obligates the Contractor to pay the first-tier Subcontractor for satisfactory performance under its subcontract within ten (10) calendar days of payment by the City out of such amounts as are paid to the Contractor by the City of Roseburg under the contract; and

6.1.2 An interest penalty clause that obligates the Contractor, if payment is not made within thirty (30) calendar days after receipt of payment from the City of Roseburg, to pay to the first-tier Subcontractor an interest penalty on amounts due in the case of each payment not made in accordance with the payment clause included in the subcontract pursuant to Paragraph 6.1.1 of this Subsection. A Contractor or first-tier Subcontractor shall not be obligated to pay an interest penalty if the only reason that the Contractor or first-tier Subcontractor did not make payment when payment was due is that the

Contractor or first-tier Subcontractor did not receive payment from the City of Roseburg or Contractor when payment was due. The interest penalty shall be:

6.1.2.1 For the period beginning on the day after the required payment date and ending on the date on which payment of the amount due is made; and

6.1.2.2 Computed at the rate specified in ORS 279C.515(2).

6.2 The Contractor shall include in each of its subcontracts, for the purpose of performance of such contract condition, a provision requiring the first-tier Subcontractor to include a payment clause and an interest penalty clause conforming to the standards set forth in Paragraphs 6.1.1 and 6.1.2 and requiring each of its Subcontractors to include such clauses in their subcontracts with each lower-tier Subcontractor or supplier.

6.3 None of the provisions of this Section 6 are intended to prevent the Contractor or any Subcontractor from including in its contracts the provisions described in ORS 279C.580(5) and (6).

7. <u>PROHIBITION OF DISCRIMINATORY WAGE RATES BASED ON SEX – ORS 652.220</u>: The Contractor shall not:

7.1 Discriminate between employees on the basis of a protected class in the payment of wages or other compensation for work of comparable character, the performance of which requires comparable skills;

7.2 Pay wages or other compensation to any employee at a rate greater than that at which the employer pays wages or other compensation to employees of a protected class for work of comparable character, the performance of which requires comparable skills. This section does not apply where:

(a) Payment is made pursuant to a seniority or merit system which does not discriminate on the basis of a protected class; or
(b) A system measures earnings by quantity or quality of production, including piece-rate work; or
(c) Travel is necessary and regular for the employee; or
(d) Education, training, experience, or any combination of factors account for the entire compensation differential.

7.3 Discriminate in the payment of wages or other compensation against any employee because the employee has filed a complaint in a proceeding, has testified or is about to testify, or because the employer believes that the employee may testify in any investigation, proceedings or criminal action pursuant to ORS 652.210 to 652.235.

8. <u>DRUG TESTING - ORS 279C.505(2)</u>:

8.1 The Contractor shall demonstrate that an employee drug testing program is in place at the time of submitting its bid, and that such program will be maintained throughout the contract period, including any extensions. The failure of Contractor to have, or to

maintain such a drug testing program is grounds for rejection of a bid or immediate termination of the contact.

8.2 The City of Roseburg shall not be liable, either directly or indirectly, in any dispute arising out of the substance or procedure of Contractor's drug testing program. Nothing in this drug testing provision shall be construed as requiring Contractor to violate any legal, including constitutional, rights or any employee, including but not limited to, selection of which employees to test and the manner of such testing. The City shall not be liable for Contractor's negligence in establishing or implementing, failure to establish or implement a drug testing policy, or for any damage or injury caused by Contractor's employees acting under the influence of drugs while performing work covered by the contract. These are Contractor's sole responsibilities and nothing in this provision is intended to create any third party beneficiary rights against the City.

9. PREVAILING WAGE PROVISIONS - ORS 279C.800 - 279C.870; 40 U.S.C. 3141 – 3148:

9.1 The hourly rate of wage to be paid by the Contractor and all Subcontractors to workers under the contract shall not be less than the prevailing rate of wage for an hour's work in the same trade or occupation in the locality where the labor is performed as set forth in the specifications for the public contract; provided however, if the public contract is also subject to the Federal Prevailing Wage Rate pursuant to the Davis-Bacon Act (40 U.S.C. 3141 - 3148), then the higher of the two rates shall be paid. The Contractor will comply with the provisions of ORS 279C.840 and all applicable provisions of ORS 279C.800 to 279C.870 and/or the Davis-Bacon Act, 40 U.S.C. 3141 - 3148.

9.2 The Contractor or the Contractor's surety and every Subcontractor or the Subcontractor's surety shall file certified statements with the City in writing using the form prescribed by the Commissioner of the Bureau of Labor and Industries certifying the hourly rate of wage paid each worker whom the Contractor or the Subcontractor has employed in the Work under the contract and further certifying that no worker employed under such public contract has been paid less than the prevailing rate of wage or less than the minimum hourly rate of wage specified in the contract. The certified statement shall be verified by the oath of the Contractor or the Contractor's surety or Subcontractor or the Subcontractor's surety that the Contractor or Subcontractor has read the certified statement and knows the contents thereof and that the same is true to the Contractor's or Subcontractor's knowledge. The certified statements shall set out accurately and completely the payroll records for the prior week including the name and address of each worker, the worker's correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wages paid.

9.3 Each certified statement shall be delivered or mailed by the Contractor or Subcontractor to the City. A true copy of the certified statement shall also be filed at the same time with the Commissioner of the Bureau of Labor and Industries. Certified statements for each week during which the Contractor or Subcontractor employs a worker under the public contract shall be submitted once a month, by the fifth business day of the following month. Information submitted on certified statements may be used only to ensure compliance with the provisions of ORS 279C.800 to 279C 870. The City shall retain 25% of the amount earned by the Contractor if the certified statements are not submitted

as required. The City shall pay the Contractor the amount retained within 14 days after the Contractor files the certified statements regardless of whether a Subcontractor has failed to file the required certified statements. The Contractor shall retain 25% of any amount earned by a first-tier Subcontractor until the Subcontractor has filed with the City, the required certified statements. The Contractor shall verify the first-tier Subcontractor has filed the certified statements before the Contractor may pay the Subcontractor any amount retained. The Contractor shall pay the first-tier Subcontractor the amount retained within 14 days after the Subcontractor files the required certified statements.

10. PUBLIC WORKS BOND REQUIREMENTS – ORS 279C.836:

10.1 If the public contract involves public works, unless exempt under ORS 279C.800 to 279C.870, prior to beginning work on the contract, the Contractor shall file with the Construction Contractors Board, a Public Works Bond in the amount of $30,000 with a corporate surety authorized to do business in the State of Oregon.

10.2 Before allowing a Subcontractor to begin work under a public contract involving public works, for which the Contractor has been awarded the contract, the Contractor shall verify that the Subcontractor has also filed a Public Works Bond with the Construction Contractors Board or elected not to file such bond as allowed by state law.

10.3 The Public Works Bond shall provide that the Contractor or Subcontract will pay claims ordered by the Bureau of Labor and Industries to workers performing labor under the public contract involving public works. The bond shall be a continuing obligation and remain continuously in effect.

10.4 If the Contractor or Subcontractor qualifies as a disadvantaged, minority, women, disabled veteran or emerging small business enterprise certified under ORS 200.055 and has elected not to file the Public Works Bond, the Contractor or Subcontractor will file written verification of such certification with the Construction Contractors Board. If the Contractor or Subcontractor elects not to file the Public Works Bond, before beginning any work on the public contract involving public works, the Contractor or Subcontractor shall provide the City and the Construction Contractors Board with written notification of such election.

11. DEMOLITION CONTRACTS; LAND AND LANDSCAPE MAINTENANCE - ORS 279C.510:

11.1 If the public contract includes demolition, the Contractor shall salvage or recycle construction and demolition debris, if feasible and cost effective.

11.2 If the public contract includes services for lawn and landscape maintenance, the Contractor shall compost or mulch yard waste material at an approved site.

12. DISCRIMINATION IN SUBCONTRACTING PROHIBITED; REMEDIES - ORS 279A.110:

12.1 The Contractor may not discriminate against a Subcontractor in the awarding of a subcontract because the Subcontractor is a minority, women, disabled veteran or emerging small business enterprise certified under ORS 200.055.

12.2 By entering into the contract, the Contractor certified it has not discriminated and will not discriminate, in violation of Subsection 12.1, against any minority, women, disabled veteran or emerging small business enterprise in obtaining any required subcontract.

12.3 If the Contractor violates the nondiscrimination certification made under Subsection 12.2, the City may regard the violation as a breach of contract that permits the City to terminate the contract or exercise any remedies for breach permitted under the contract.

13. HIGHEST STANDARDS; CONSEQUENCES FOR FAILURE – ORS 279B.060:

13.1 By entering into the Contract, Contractor agrees to perform the work to the highest standards prevalent in the industry or business most closely related to the work to be provided;

13.2 Contractor understands that failure to meet the highest standards in the industry may result in consequences including, but not limited to:

13.2.1 reducing or withholding of payment;

13.2.2 requiring Contractor to perform, at Contractor's own expense, additional work required to meet such standards; or

13.2.3 declaring a default, terminating the Contract and seeking damages and other relief available under the terms of the Contract or other applicable law.

14. COMPLIANCE WITH LAWS: The Contractor and Subcontractor shall comply with all federal, state and local laws, rules, ordinances and regulations at all times and in the performance of the contract.

CITY OF ROSEBURG
PUBLIC WORKS BOND FILING CERTIFICATION

Pursuant to ORS 279C.800 to 279C.870, I, undersigned contractor, do hereby certify that, prior to beginning work on the Project for which I have been awarded the bid by the City of Roseburg:

1. I have filed with the Construction Contractors Board ("Board"), a Public Works Bond in the amount of $30,000 with a corporate surety authorized to do business in the State of Oregon.
_____**Yes** _____**No (Check one)**

2. I have elected not to file a Public Works Bond with the Board because I am a disadvantaged, minority, women, disabled veteran or emerging small business enterprise certified under ORS 200.055. I have provided the Board written verification of such certification and written notification of my election not to file the Public Works Bond. I understand that my election not to file the Public Works Bond will expire one year from the date it was filed and that a claim for unpaid wages may be filed against the payment bond I submitted on the Project.
_____**Yes** _____**No (Check one)**

3. I have verified any subcontractor involved in the Project has, prior to beginning any work on this Project, either filed the Public Works Bond with the Board or has elected not to file the Public Works Bond because the subcontractor is a disadvantaged, minority, women, disabled veteran or emerging small business enterprise certified under ORS 200.055.
_____**Yes** _____**No (Check one)**

(a) I have verified that any subcontractor involved in this Project that has elected not to file the Public Works Bond has provided the Board written verification of its certification under ORS 200.055 and written notification of its election not to file the Public Works Bond. _____**Yes** _____**No (Check one)**

I understand the Public Works Bond described above is in addition to any other bond that I am required to provide, or that may be required by a subcontractor, for this Project.

Project Name:_____

Project Number:_____

Contractor's Printed Name:_____

Contractor's Signature:_____

Dated:_____

CITY OF ROSEBURG
STANDARD PERFORMANCE BOND

Bond No.: _____
Solicitation: _____
Project Name: _____

_____(Surety #1) Bond Amount No. 1: $_____
_____(Surety #2)* Bond Amount No. 2: $_____
**If using multiple sureties* Total Penal Sum of Bond $_____

We, _____ as Principal, and the above identified Surety(ies), authorized to transact surety business in Oregon, as Surety, hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns, firmly by these presents to pay to the City of Roseburg the sum of (Total Penal Sum of Bond) _____
(Provided that we the Sureties bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety), and

WHEREAS, the Principal has entered into a contract with the City of Roseburg, the plans, specifications, terms and conditions of which are contained in the above-referenced Solicitation;

WHEREAS, the terms and conditions of the contract, together with applicable plans, standard specifications, special provisions, schedule of performance, and schedule of contract prices, are made a part of this Performance Bond by reference, whether or not attached to the contract (all hereafter called "Contract"); and

WHEREAS, the Principal has agreed to perform the Contract in accordance with the terms, conditions, requirements, plans and specifications, and all authorized modifications of the Contract which increase the amount of the work, the amount of the Contract, or constitute an authorized extension of the time for performance, notice of any such modifications hereby being waived by the Surety:

NOW, THEREFORE, THE CONDITION OF THIS BOND IS SUCH that if the Principal herein shall faithfully and truly observe and comply with the terms, conditions and provisions of the Contract, in all respects, and shall well and truly and fully do and perform all matters and things undertaken by Contractor to be performed under the Contract, upon the terms set forth therein, and within the time prescribed therein, or as extended as provided in the Contract, with or without notice to the Sureties, and shall indemnify and save harmless the City of Roseburg and members thereof, its officers, employees and agents, against any direct or indirect damages or claim of every kind and description that shall be suffered or claimed to be suffered in connection with or arising out of the performance of the Contract by the Principal or its subcontractors, and shall in all respects perform said Contract according to law, then this obligation is to be void; otherwise, it shall remain in full force and effect.

Nonpayment of the bond premium will not invalidate this bond nor shall the City of Roseburg be obligated for the payment of any premiums.

This bond is given and received under authority of ORS Chapters 279A, 279B and 279C, the provisions of which hereby are incorporated into this bond and made a part hereof.

IN WITNESS WHEREOF, WE HAVE CAUSED THIS INSTRUMENT TO BE EXECUTED AND SEALED BY OUR DULY AUTHORIZED LEGAL REPRESENTATIVES.

Dated this _____ day of _____, 2021.

PRINCIPAL: _____

By

_____
Signature

_____
Official Capacity

Attest:

_____
Corporation Secretary

SURETY: _____
[Add signatures for each surety if using multiple bonds]

BY ATTORNEY-IN-FACT:
[Power-of-Attorney must accompany each surety bond]

_____
Name

_____
Signature

_____
Address

_____
City State Zip

_____
Phone Email

CITY OF ROSEBURG
PAYMENT BOND

Bond No.: _____
Solicitation: _____
Project Name: _____

_____(Surety #1) Bond Amount No. 1: $_____
_____(Surety #2)* Bond Amount No. 2: $_____
**If using multiple sureties* Total Penal Sum of Bond $_____

We, _____ as Principal, and the above identified Surety(ies), authorized to transact surety business in Oregon, as Surety, hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns, firmly by these presents to pay to the City of Roseburg the sum of (Total Penal Sum of Bond) _____
(Provided that we the Sureties bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety), and

WHEREAS, the Principal has entered into a contract with the City of Roseburg, the plans, specifications, terms and conditions of which are contained in the above-referenced Solicitation;

WHEREAS, the terms and conditions of the contract, together with applicable plans, standard specifications, special provisions, schedule of performance, and schedule of contract prices, are made a part of this Payment Bond by reference, whether or not attached to the contract (all hereafter called "Contract"); and

WHEREAS, the Principal has agreed to perform the Contract in accordance with the terms, conditions, requirements, plans and specifications, and schedule of Contract prices which are set forth in the Contract and any attachments, and all authorized modifications of the Contract which increase the amount of the work, or the cost of the Contract, or constitute authorized extensions of time for performance of the Contract, notice of any such modifications hereby being waived by the Surety:

NOW, THEREFORE, THE CONDITION OF THIS BOND IS SUCH that if the Principal shall faithfully and truly observe and comply with the terms, conditions and provisions of the Contract, in all respects, and shall well and truly and fully do and perform all matters and things by it undertaken to be performed under said Contract and any duly authorized modifications that are made, upon the terms set forth therein, and within the time prescribed therein, or as extended therein as provided by the Contract, with or without notice to the Sureties, and shall indemnify and save harmless the City of Roseburg and members thereof, its officers, employees and agents, against any direct or indirect damages or claim of every kind and description that shall be suffered or claimed to be suffered in connection with or arising out of the performance of the Contract by the Contractor or its subcontractors, and shall promptly pay all persons supplying labor, materials or both to the Principal or its subcontractors for

prosecution of the work provided in the Contract; and shall promptly pay all contribution due according to workers compensation requirements and the State Unemployment compensation Fund from the Principal or its subcontractors in connection with the performance of the Contract; and shall pay over to the Oregon Department of Revenue all sums required to be deducted and retained from the wages of employees of the Principal and its subcontractors pursuant to ORS 316.167, and shall permit no lien nor claim to be filed or prosecuted against the City on account of any labor or materials furnished; and do all things required of the Principal by the laws of this State, then this obligation shall be void; otherwise, it shall remain in full force and effect.

Nonpayment of the bond premium will not invalidate this bond nor shall the City of Roseburg be obligated for the payment of any premiums.

This bond is given and received under authority of ORS Chapters 279A, 279B and 279C, the provisions of which hereby are incorporated into this bond and made a part hereof.

IN WITNESS WHEREOF, WE HAVE CAUSED THIS INSTRUMENT TO BE EXECUTED AND SEALED BY OUR DULY AUTHORIZED LEGAL REPRESENTATIVES.

Dated this _____ day of _____, 2021.

PRINCIPAL: _____

By _____
Signature

_____
Official Capacity

Attest: _____
Corporation Secretary

SURETY: _____
[Add signatures for each surety if using multiple bonds]

BY ATTORNEY-IN-FACT:
[Power-of-Attorney must accompany each surety bond]

_____
Name

_____
Signature

_____
Address

_____
City State Zip

_____
Phone Email

LOWEST BIDDER RESPONSIBILITY DETERMINATION FORM

(TO BE COMPLETED BY THE CITY UPON NOTICE OF INTENT TO AWARD)

"Lowest responsible bidder" means the lowest bidder who is not on the list established by the Construction Contractors Board pursuant to ORS 701.227 and who has:

1. Substantially complied with all prescribed public contracting procedures and requirements of the State of Oregon and the City of Roseburg;
2. Met the standards of responsibility described in ORS 279B.110 and 279C.375, and Roseburg Municipal Code Chapter 3.06; and
3. Not been disbarred or disqualified from bidding or debarred by the State of Oregon under ORS 279B.130 or 279C.440, or by the City under the provisions of Roseburg Municipal Code Chapter 3.06.

Project Name:_____

Bid/Project Number:_____

Business Entity/ Bidder's Name:_____

CCB License Number:_____

Form submitted by City of Roseburg.
Form submitted by:

Name:_____

Title:_____

Date:_____

The City has (check all of the following):

[ ] Checked the list created by the Construction Contractors Board under ORS 701.227 for bidders who are not qualified to hold a public improvement contract.

[ ] Determined whether the bidder has met the standards of responsibility. In so doing, the City has found that the bidder demonstrated that the bidder:

[ ] Has available the appropriate financial, material, equipment, facility and personnel resources and expertise, or the ability to obtain the resources and expertise, necessary to meet all contractual responsibilities.

[ ] Holds current licenses that businesses or service professionals operating in this state must hold in order to undertake or perform the work specified in the Contract.

[ ] Is covered by liability insurance and other insurance in amounts required in the solicitation documents.

[ ] Qualifies as a carrier-insured employer or a self-insured employer under ORS 656.407, or has elected coverage under ORS 656.128.

[ ] Has disclosed the bidder's first-tier subcontractors in accordance with ORS 279C.370.

[ ] Has a satisfactory record of performance.

[ ] Has a satisfactory record of integrity.

[ ] Is legally qualified to contract with the City.

[ ] Possesses a certificate that the Oregon Department of Administrative Services issued under ORS 279A.167 – Pay Equity Compliance (if applicable)**. (NEW)**

[ ] Has supplied all necessary information in connection with the inquiry concerning responsibility.

[ ] Determined the bidder to be (check one of the following):

[ ] Responsible under ORS 279C.375(3)(a) and (b).

[ ] Not responsible under ORS 279C.375(3)(a) and (b).

If the City has found the bidder not to be responsible, please see attached document explaining the City's determination.

Note: This form is to be submitted by the City of Roseburg to the Construction Contractors Board immediately following issuance of the City's Notice of Intent to Award the subject contract. A copy must immediately be filed with the City Recorder.

BUREAU OF LABOR AND INDUSTRIES
PREVAILING WAGE RATES FOR PUBLIC WORKS CONTRACTS

Prevailing Wage Rates are the minimum wages that must be paid to all workers employed in the construction, reconstruction, major renovation or painting of all public works, unless specifically exempted by state or federal law. Rather than including the entire State and/or Federal Prevailing Wage Rate publications in the bid specifications and contract, public entities may make reference to the specific prevailing wage rate publication where the prevailing wage rates are found *or* provide a link to the specific prevailing wage rate publication where the prevailing wage rates are found.

Oregon Bureau of Labor and Industries Prevailing Wage Rates applicable to the subject project/contract are available on BOLI's website at www.oregon.gov.boli. The prevailing wages to be applied throughout the duration of this project are those in effect for BOLI Prevailing Wage Rate Region 6, (Douglas County Oregon), upon the date the project is first advertised.

Federal Prevailing Wages Rates under the Davis Bacon Act (40 U.S.C. 3141 et seq.) may be found at www.wdol.gov. The prevailing wages to be applied throughout the duration of this project are those in effect for Federal Prevailing Wage Rates under the Davis Bacon Act (40 U.S.C. 3141 et seq.) at the time the initial specifications were first advertised for bid solicitations.

If the project is subject to both ORS 279C.800 to 279C.870 and to the Davis Bacon Act (40 U.S.C. 3414 et seq.), the contractor and every subcontractor shall pay the higher of the applicable state or federal prevailing rate of wage to all workers on the projects.

For specific information or questions regarding the Prevailing Wage Rate Law, you may log on to the above referenced websites or contact the nearest Oregon Bureau of Labor and Industries office listed below.

BOLI Office Locations

Eugene	1400 Executive Parkway, Eugene, OR 97401	541/686-7623
Medford	700 E. Main, Suite 105, Medford, OR 97504	541/776-6270
Portland	800 NE Oregon St., #32, Portland, OR 97232	503/731-4074
Salem	3865 Wolverine St. NE, Bldg. E-1, Salem, OR 97305	503/378-3292

THIS PROJECT IS SUBJECT TO THE OREGON BOLI PREVAILING WAGE RATES EFFECTIVE ON July 1, 2021

GENERAL CONDITIONS

1. DEFINITIONS

1.1 Whenever used in these General Conditions or in the other Contract Documents, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

"Acceptance" means that the work has been completed in accordance with the Contract Documents and approved in writing by the Owner.

"**Act of God or Nature"** means a natural phenomenon of such catastrophic proportions or intensity as would reasonably prevent performance.

"Addendum" means any written document, signed by all parties, pertaining to additions, deletions, revisions or other issues with the Contract Documents issued after the Contract Documents have been issued.

"Bid" means the offer of a bidder to perform the work described by the Contract Documents when made out and submitted on the prescribed Bid Form and properly signed.

"Bidder" means any person, firm, partnership, corporation, limited liability company, or other entity submitting a bid for the work described hereunder.

"Change Order" means a document recommended by the Project Manager which is signed by the Contractor and the City and authorizes an addition, deletion or revision in the work or an adjustment in the Contract price or Contract times, issued on or after the effective date of the Contract.

"City" means the City of Roseburg located in the State of Oregon, and owner of the Project and work related thereto.

"Contract Documents" means and includes the Invitation to Bid, Information for Bidders, Bid Form, Construction Contract with Exhibit "A" Standard Contract Provisions, First-Tier Subcontractor Disclosure Form, Drug Testing Program Certification Form, Bidder's Responsibility Form, Performance Bond, Payment Bond, Public Works Bond Filing Certification form (when required), General Conditions, Technical Provisions, Special Conditions, Standard Drawings, Specifications & Plans, and Supplemental Specifications all as required for the full execution and satisfactory completion of the Project.

"Contractor" means the firm, partnership, corporation, limited liability company, or other entity executing the Contract with the City for the performance of the work herein described.

“Defective” means, when modifying the work, refers to work that is unsatisfactory, faulty or deficient in that it:

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test or approval referred to in the Contract Documents; or

c. has been damaged prior to the Project Manager’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by the City at Substantial Completion in accordance with the Contract Documents).

“Design Consultant” means the firm who prepared the Plans and Specifications and shall not mean the Project Manager.

"Engineer" means the City's authorized Engineer, as designated by the City Manager or Public Works Director for the Contract, either acting directly or through the inspector, within the scope of assigned duties.

“Final Completion” means that all work has been completed in conformance with the Contract Documents and the Contract has been fully performed.

“Holidays” means any Oregon legal holiday.

“Liquidated Damages” means that which is set forth in Subsection 6.9 herein.

“Milestone” means a principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all of the work.

“Pay Equity Compliance Certificate” means a certificate issued by the Department of Administrative Services pursuant to ORS 279A.167 following completion of pay equity training.

"Payment Bond” means the approved form of security furnished by the Contractor and Contractor's Surety as a guarantee of good faith on the part of the Contractor to make all payments that are the Contractor's obligations, in accordance with the terms of the Contract.

“Performance Bond" means the approved form of security furnished by the Contractor and Contractor's Surety as a guarantee of good faith on the part of the Contractor to execute the work that is the Contractor's obligation, in accordance with the terms of the Contract.

"Plans" means and includes the City approved maps, standard drawings, work order drawings and supplemental drawings and sketches which will show the locations, character, dimensions and details of the work to be done.

"Project" means all work described and specified herein and as indicated on the Plans.

“Project Manager” means the City’s authorized Project Manager for the Contract, as designated by the City Manager or Public Works Director, either acting directly or through a designated representative, within the scope of assigned tasks.

“Proposal Request” means a written statement issued by the Project Manager to the Contractor on or after the effective date of the Contract and signed by the City and the Contractor identifying additions, deletions or revisions in the work, or responding to differing or unforeseen subsurface or physical conditions under which the work is to be performed or to emergencies. A Proposal Request will not change the Contract price or the Contract times but is evidence that the parties expect that the change ordered or documented by a Proposal Request will be incorporated in a subsequently issued Change Order.

“Public Works Bond” means a $30,000 form of security furnished by the Contractor and/or Subcontractor and Contractor’s and/or Subcontractor’s Surety to the Construction Contractors Board to pay claims ordered by the Bureau of Labor and Industries to workers performing labor under a public works project.

“Punch List” means a list developed by the Project Manager after Substantial Completion that identifies defects or deficient workmanship or work not completed in conformance with the Contract Documents.

“Request for Information” means a formal request from the Contractor to the Project Manager requesting clarification and/or direction necessary to complete the work.

“Signature” means either a hand written or electronic signature.

"Specifications" means and includes the directions, provisions and requirements contained herein and referred to herein pertaining to the Project.

“Submittals” means all drawings, diagrams, material data, schedules and other information which are specifically prepared or assembled by or for the Contractor and submitted by the Contractor to illustrate some portion of the work.

“Substantial Completion” means that the degree of completion of the Project, or portion of the Project as evidenced by the Project Manager’s written notice of Substantial Completion, sufficient to provide the City, the full-time use of the Project, or portion of the Project, for the purpose for which it was intended. Determination of Substantial Completion is solely at the discretion of the Project Manager. Substantial Completion does not mean complete in accordance with the Contract nor shall Substantial Completion of all or any part of the Project entitle the Contractor to final acceptance under the Contract. The criteria the Project Manager may use in exercising his/her discretion in determining Substantial Completion includes, but is not limited to, the completion of all equipment contained in the Project, or portion of the Project, all other components necessary to enable the City to operate the facility in the manner that was intended.

"Superintendent" means the executive representative of Contractor, authorized to receive and fulfill instructions from the Project Manager or Project Manager's representatives.

"Supplemental Specifications" means specific instructions setting forth conditions or requirements peculiar to the Project under consideration when said Project is not completely covered by the Specifications contained herein.

"Surety" means the person, firm, partnership, corporation, limited liability company or other entity that has the requisite authority to execute the bonds required from the Contractor.

2. CONTRACT DOCUMENTS

2.1 Award, Execution of Documents, Delivery of Bonds.

2.1.1 If awarded, the Contract will be awarded to the lowest responsible bidder whose qualifications indicate the award will be in the best interest of the City and whose bid complies with all the prescribed requirements. No award will be made until the City has concluded such investigations as the City deems necessary to establish the responsibility, qualifications and financial ability of the Bidders to do the work in accordance with the Contract Documents.

2.1.2 In determining the lowest responsible bidder for the purpose of awarding the Contract, the City, pursuant to ORS 279A.120 shall:

2.1.2.1 give preference to goods and services that have been manufactured or produced in Oregon if the price, fitness, availability and quality are otherwise equal; and

2.1.2.2 add a percentage increase on the bid of a nonresident bidder equal to the percent, if any, of the preference given to that bidder in the state in which the bidder resides.

2.1.3 The City reserves the right to reject any and all bids not in compliance with all public bidding procedures and requirements or when such rejection is in the interest of the City; to reject the bid of a bidder who has previously failed to perform properly or complete contracts of a similar nature on time; and to reject the bid of a bidder who is not, in the opinion of the City, in a position to perform the Contract. If the Contract is awarded, the City will give the successful bidder written notice of award within forty-five (45) calendar days after bid opening.

2.1.4 At least three (3) counterparts of the Construction Contract and such other Contract Documents as practicable will be signed by the City and Contractor. The Contractor shall receive one (1) executed counterpart of the Contract Documents.

2.1.5 When required by the specifications, the Contractor shall deliver simultaneously with the execution of the Contract Documents a good and sufficient Payment Bond to ensure payment of the obligations incurred in the

performance of this Contract, a Performance Bond to assure performance of the Contract and the Public Works Bond Filing Certification form executed by the Contractor. No exceptions will be made to this provision.

2.1.6 Failure of the successful bidder to execute the Contract Documents and deliver the required Payment Bond, Performance Bond and Public Works Bond Filing Certification form within ten (10) calendar days of the notification of the award of the Contract shall be just cause for the City to annul the award.

2.2 Correlation, Interpretation, and Intent of Contract Documents.

2.2.1 The intent of the Plans and Specifications as contained herein is to describe the complete Project which the Contractor shall undertake to do in full compliance with the Construction Contract with Exhibit "A", Plans and Specifications. The Contract Documents comprise the entire agreement between the City and the Contractor. The Contract Documents may only be altered as provided in the General Conditions of the Contract.

2.2.2 The Plans and Specifications are intended to be explanatory and complimentary of each other. Contractor shall execute any work indicated in the Plans and not in the Specifications, or vice versa, as if indicated in both. Should any work or materials be reasonably required or intended for carrying the Project to satisfactory completion, which is inadvertently omitted on the Plans and Specifications, Contractor shall furnish the same as fully as if particularly delineated or described. Should it appear that the work to be done or any of the matters relative thereto are not sufficiently detailed or explained in the Contract Documents, the Contractor shall apply to the Project Manager for further explanations as may be necessary and shall conform thereto so far as may be consistent with the terms of the Contract. In the event any doubt or question arising respecting the true meaning of the Plans or Specifications, Contractor may seek a determination by the Project Manager according to Subsection 3.2 and Paragraph 3.3.3. Should the Contractor disagree with the Project Manager's decision, the Contractor may appeal to the City Manager in accordance with Paragraph 3.4.2. In resolving such conflicts, errors and/or discrepancies, the Contract Documents shall be given precedence in the following order: Construction Contract with Exhibit "A", the Plans and the Specifications. Within the Specifications, the order of precedence shall be as follows: General Conditions, Information for Bidders, Special Conditions and Technical Provisions.

2.2.3 Figure dimensions on Plans shall govern over scale dimensions, and detailed drawings shall govern over general drawings. Any work that may reasonably be inferred from the Plans and/or Specifications as being required to produce the intended result shall be supplied whether or not it is specifically called for. Work, materials or equipment described in words which so applied have a well-known technical or trade meaning shall be deemed to reference such recognized standards. The Contractor assumes full responsibility for having familiarized himself with the nature and extent of the Contract Documents, work locality and local conditions that may in any manner affect the work to be done.

2.3 Verification and Warranty. The Contractor shall make the determination of the nature of the work proposed under the Contract, local conditions which can be encountered within the Project area and all other matters which can in any way affect the work proposed under the Contract. It shall also be the responsibility of the Contractor to be thoroughly familiar with the Contract Documents. Failure to make the examination necessary for this determination or to examine any form, instrument or document of the Contract with Exhibit "A" shall not release the Contractor from the obligations of the Contract with Exhibit "A". The Contractor warrants that no oral or written agreement or conversation with any officer, agent or employee of the City, either before or after the execution of the Contract, has affected or modified any of the terms or obligations herein contained.

2.4 Documents to be Kept on the Jobsite. The Contractor shall keep at least one (1) copy of the Contract Documents at the jobsite, in good order, available to the Project Manager.

2.5 Additional Contract Documents. The City will furnish to the Contractor, on request and free of charge, up to three (3) copies of the Contract Documents. Additional copies of Contract Documents may be obtained upon request by paying the actual cost of reproduction.

2.6 Surveys. When required for the Project, surveying and staking of the component parts of the work shall be as detailed in the Specifications and on the Plans. The Contractor shall construct the work in accordance with the construction stakes and shall be charged with full responsibility for conformity and agreement of the work with said construction stakes.

3. PROJECT MANAGER-CITY CONTRACTOR RELATIONS

3.1 General. The City has the authority to act as the sole judge of the work with respect to both quantity and quality as set forth in the Contract. It is expressly stipulated that the Plans, Specifications and other Contract Documents set forth the requirements as to the nature of the completed work and do not purport to control the method of performing work except in those instances where the nature of the completed work is dependent on the method of performance.

3.2 Project Manager. The Project Manager is the representative of the City and is employed to act as advisor and consultant to the City in project managing matters related to the Contract. The City has delegated its authority to the Project Manager to make initial decisions regarding all claims and questions, which may arise as to the quality or acceptability of materials furnished and work performed and as to the manner of performance and rate of progress of the work under the Contract. The Project Manager determines the intent and meaning of the Contract and makes initial decisions with respect to the Contractor's fulfillment of the Contract and the Contractor's entitlement to compensation. Should the Contractor disagree with a decision of the Project Manager with respect to the Contract, the Contractor may request that the City Manager review the Project Manager's decision and make a determination in the manner provided under Paragraph 3.4.2.

The Project Manager may designate a field representative as an alternate in his/her capacity on the job site. All notifications required under the Contract shall be made directly to the Project Manager or the designated representative.

3.3 Duties and Responsibilities of the Project Manager

3.3.1 The Project Manager will make periodic visits to the site of the Project to observe the progress and quality of the work and to determine, in general, if the work is proceeding in accordance with the intent of the Contract Documents. The Project Manager shall not be required to make comprehensive or continuous inspections to check the quality or quantity of the work, and shall not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Project. Visits and observations made by the Project Manager shall not relieve the Contractor of obligations to conduct comprehensive inspections of the work, to perform acceptable work and to provide adequate safety precautions.

3.3.2 The Project Manager or the field representative thereof will be assigned to periodically observe the work and to act in matters of construction under the Contract. It is understood the Project Manager or field representative shall have the power to issue instructions and make decisions within the limitations of the authority granted by the City. Such inspection shall not relieve the Contractor of obligations to conduct comprehensive inspections of the work, perform acceptable work and provide adequate safety precautions.

3.3.3 All claims of the Contractor shall be presented to the Project Manager or designated representative, for a decision which shall be made in writing within a reasonable time. All decisions of the Project Manager shall be final subject only to the Contractor's right to appeal the Project Manager's decision to the City Manager in the manner provided in Subsection 3.4.

3.4 Appeal to the City Manager by the Contractor.

3.4.1 Determination by the Project Manager. As provided in Subsections 3.1, 3.2, and 3.3, the Contractor shall refer questions regarding meaning and intent of the Contract Documents in writing to the Project Manager for his/her decision. The Project Manager shall, within a reasonable time, respond to the Contractor in writing with his/her decision. If the Contractor disagrees with the Project Manager's decision or considers the decision requires extra work, Contractor may appeal the decision to the City Manager. Any related work performed by the Contractor prior to the Project Manager's decision is done at Contractor's risk unless otherwise authorized by the Project Manager.

3.4.2 City Manager Appeal Process. In the event the Contractor disagrees with any decision of the Project Manager, the Contractor may, within ten (10) calendar days of the date of such decision, appeal the decision to the City Manager for review. The appeal must be in writing and must set forth the questions referred to the Project Manager, the Project Manager's decision and the Contractor's basis for disagreement. The Contractor shall deliver a copy of

the appeal to the Project Manager at the time it is filed with the City Manager. The City Manager shall make all reasonable efforts to review the appeal and deliver his/her decision in writing to the Contractor within thirty (30) calendar days from the date of receipt of the appeal. Failure of the Contractor to appeal the decision of the Project Manager within the said ten (10) calendar day period constitutes a knowing and voluntary waiver of the Contractor's right to thereafter assert any claim resulting from such decision. This procedure is not meant to preclude or discourage informal resolution of disagreements between the Project Manager and the Contractor.

In the event the City Manager elects to do so, the City Manager may establish a "Claims Review Board" either to assist in reviewing an appeal hereunder or to consider Contractor appeals directly. Once established, the Claims Review Board will hear all future appeals of claims for this Contract.

During the pendency of any appeal, any related work performed by the Contractor shall be done at the Contractor's risk unless otherwise authorized by the Project Manager.

The filing of an appeal does not automatically extend the milestones and/or deadlines set forth in the Contract Documents and the Contractor continues to be subject to liquidated damages for failure to complete the Project within the time allotted.

In the event the City Manager or the Contractor commences arbitration or other legal action against the other for damages or for equitable relief, the prevailing party in such arbitration or other legal action is entitled to recover its reasonable attorney's fees therein and in any appeal therefrom.

The parties hereby stipulate and consent that venue for all arbitration or other legal actions arising under the Contract is in Douglas County, Oregon and that jurisdiction for all legal actions that are brought in or transferred to court is in the Douglas County Circuit Court of the State of Oregon; except, if a claim must be brought in a federal forum, then it must be brought and adjudicated solely and exclusively in the United States District Court for the District of Oregon located in Eugene, Oregon.

3.5 Suspension of Work. The Project Manager shall, in addition to its other authority, have the authority to suspend the work, wholly or in part, for such period or periods as may be deemed necessary due to unsuitable weather or such other conditions as are considered unfavorable for prosecution of the work, or failure on the part of the Contractor to carry out the provisions of the Contract. The Contractor shall not suspend operation without the permission of the Project Manager or Project Manager's authorized representative.

3.6 Notice of Potential Claim for Additional Compensation and/or Time.

3.6.1 The Contractor shall not be entitled to any additional compensation or extension of time for any act or failure to act by the Project Manager or the City,

the happening of any event or occurrence or any other cause, unless the Contractor shall have given the Project Manager a written notice of potential claim.

3.6.2 The written notice of potential claim shall set forth the reasons for which the Contractor believes additional compensation or time will or may be due, the nature of the costs involved and insofar as possible, the amount of the potential claim. If based on an act or failure to act by the Project Manager or the City, except in case of emergency, such notice shall be given to the Project Manager prior to the time that the Contractor starts performance of the work giving rise to the potential claim for additional compensation. In all other cases, notice shall be given within ten (10) calendar days after the happening of the event or occurrence giving rise to the potential claim.

3.6.3 It is the intention of this section that differences between the parties arising under and by virtue of the Contract shall be brought to the attention of the Project Manager at the earliest possible time in order that such matters may be settled if possible or other appropriate action may be taken promptly.

3.7 Examination of Completed Work. If the Project Manager requests it, the Contractor at any time before acceptance of the Project by the City, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standards required by the Contract Documents. Should the work thus exposed or examined prove to be in accordance with the Contract Documents, the uncovering or removing, the replacing of the covering or making good of the parts removed, shall be paid for by the City; but should the work so exposed or examined prove to be not in accordance with the Contract Documents, the uncovering or removing and the replacing of the covering or the making good of the parts removed, shall be at Contractor's expense. Should any work be performed without giving notice of plan of work, thereby eliminating an opportunity of inspection by the Project Manager, the Project Manager may require the Contractor to uncover such work at Contractor's own expense for examination by the Project Manager. Cost of uncovering such work shall be borne by the Contractor, whether or not the work is found acceptable. The work shall also be subject to inspection by appropriate governmental inspectors at all times.

3.8 Contractor's Superintendent. A qualified superintendent, who is acceptable to the Project Manager, shall be maintained by the Contractor on the Project to give efficient supervision over the Project until its completion. The superintendent shall have full authority to act on behalf of the Contractor, and all directions given to the superintendent shall be considered given to the Contractor. In general, the Project Manager's instructions shall be confirmed in writing and always upon written request from the Contractor.

3.9 Information Regarding Existing Facilities and Utilities.

3.9.1 Facilities. Any information relative to the location of other structures as might be shown on the Contract Documents will be obtained from the best information available and field observations; however, the City cannot guarantee the accuracy or completeness of this information.

3.9.2 Utilities. The Design Consultant has endeavored to determine the existence of utilities at the job site from the records of positions of these utilities as derived from such records as are shown on the Drawings. No excavations were made to verify the location shown for underground utilities. The service connections to these utilities are not shown on the Drawings. It is the responsibility of the Contractor to determine the exact location of all utilities and service connections hereto. The Contractor shall make its own investigations, including contacting the owners of appropriate utilities and making exploratory excavations to determine the locations and type of existing utilities, including service connections, prior to commencing work that could result in damage to such utilities and/or surrounding structures. The Contractor shall immediately notify the Project Manager as to any utility discovered by the Contractor that is not shown on the Drawings or that is in a different position than shown on the Drawings.

In the event it is necessary to remove, relocate or temporarily maintain a utility because of interference with the work, the Contractor shall perform the work on the utility and the City shall pay Contractor as follows:

3.9.2.1 When it is necessary to remove, relocate or temporarily maintain a service connection, the cost of which is not required to be borne by the owner thereof, the Contractor bears all expenses incidental to the work on the service connection. The Contractor shall perform the work on the service connection in a manner satisfactory to the owner thereof; if being understood that the owner of the service connection has the option of doing such work with its own forces, or permitting the work to be done by the Contractor.

3.9.2.2 When it is necessary to remove, relocate or temporarily maintain a utility or underground obstruction that is in the position shown on the Drawings, the cost of which is not required to be borne by the owner thereof, the Contractor bears all expenses incidental to the work on the utility. The Contractor shall perform the work on the utility in a manner satisfactory to the owner thereof; it being understood that the owner of the utility has the option of doing such work with its own forces, or permitting the work to be done by the Contractor.

3.9.2.3 When it is necessary to remove, relocate or temporarily maintain a utility or underground obstruction that is not shown on the Drawings or is in a position different from that shown on the Drawings and were it in the position shown on the Drawings would not need to be removed, relocated or temporarily maintained, the cost of which is not required to be borne by the owner thereof, the City will make

arrangements with the owner of the utility for such work to be done at no cost to the Contractor.

No representations are made that the obligations to move or temporarily maintain any utility and to pay the cost thereof, is or is not required to be borne by the owner of such utility, and it is the responsibility of the Contractor to investigate to determine whether or not said cost is required to be borne by the owner of the utility.

Governmental agencies and owners of utilities reserve the right to enter at any time upon any street, alley, right-of-way or easement for the purpose of making changes in their property made necessary by the work and for the purpose of maintaining and making repairs to their property.

3.10 Use of Premises

3.10.1 All work included under the Contract is to be constructed on land belonging to the City, on public right-of-way administered and regulated by state and/or local government or on easements to the benefit of the City or the public. The Contractor shall abide by special conditions or requirements of the property owner or governing authority. The Contractor shall confine equipment, the storage of materials and the operation of Contractor's workers to the limits as shown on the Plans or as indicated by law, ordinances, permits or directions of the Project Manager and shall not unreasonably encumber the premises with materials.

3.10.2 Any additional land and access thereto which the Contractor might desire for temporary construction facilities or for storage of materials shall be provided by the Contractor with no liability to the City. The Contractor shall pay all costs involved in acquiring such rights and all clean up shall be made as required by these Specifications.

3.11 Private Property. The Contractor shall not enter upon private property for any purpose without obtaining permission and shall be responsible for the preservation of all public property, trees, monuments, etc. along and adjacent to the street and/or right-of-way, and shall use every precaution necessary to prevent damage or injury thereto. The Contractor shall use suitable precautions to prevent damage to pipes, conduits and other underground structures, including but not limited to, verifying with all appropriate utilities where underground structures are located, and shall protect carefully from disturbance or damage all monuments and property marks until an authorized agent has witnessed or otherwise referenced their location and shall not remove them until directed.

3.12 Assignment of Contract. Contractor shall not sublet, sell or assign the Contract or sublet any of the work to be performed hereunder without the written consent of the City. Any such assignment or subletting of any such work without City's consent shall be null and void and without force or effect.

3.13 City's Right to do Work. If, in the sole opinion of the Project Manager, the Contractor neglects to prosecute the work properly or neglects or refuses at Contractor's own cost, to take up and replace work that has been rejected by the Project Manager, the Project Manager shall notify the City who shall notify the Surety of the condition. After at least ten (10) calendar days written notice to the Contractor and the Contractor's Surety, or without notice if an emergency or danger to the Project or public exists, and without prejudice to any other right which the City may have under the Contract, the City may take over that portion of the Project which has been improperly executed, make good the deficiencies and deduct the actual costs thereof from the payments then or thereafter due the Contractor. If no amount is owed to the Contractor, then the City may still pursue all of its other legal and/or equitable remedies.

3.14 City's Right to Terminate Contract.

3.14.1 Upon occurrence of any one or more of the following, the City may terminate the Contract at any time, immediately or upon such notice as the City in its sole discretion deems appropriate, by providing written notice to the Contractor which describes the reason for termination:

3.14.1.1 Contractor persistently fails to perform the work in accordance with the Contract Documents, including but not limited to, failure to supply sufficient skilled workers, suitable materials or equipment and failure to adhere to the progress schedule as the schedule may be revised from time to time;

3.14.1.2 Contractor fails to comply with applicable laws or the provisions of any of the Contract Documents, including, but not limited to the Construction Contract with Exhibit “A” Standard City Contract Provisions;

3.14.1.3 Contractor disregards the authority of the Project Manager;

3.14.1.4 Contractor violates any provision of the Contract and, after receiving notice of the violation, fails to remedy the breach immediately; or

3.14.1.5 Contractor files for bankruptcy under any chapter of the Bankruptcy Code (Title 11, United States Code); or a petition in bankruptcy is filed against Contractor under the Bankruptcy Code or any other provision of law seeking substantial relief; or Contractor makes a general assignment for the benefit of creditors; or a trustee, receiver or similar agent is appointed to take charge of Contractor's property for the benefit of creditors; or Contractor otherwise admits in writing to being unable to pay its debts as they become due.

3.14.2 Upon the City’s issuance of written notice of termination, the Contractor shall immediately cease all work under this Contract, unless, as shall be specified

in the notice, the City, in its sole discretion, would be harmed by any uncompleted work, in which case, Contractor shall complete those items specified by the City in its notice.

3.14.3 The City may terminate the Contract upon seven (7) calendar days' notice if the City determines for any reason that the completion of the Contract is no longer in the best interests of the City.

3.14.4 If the City terminates the Contract pursuant to Paragraph 3.14.1, the City may choose any remedy available to it under the Contract, applicable statutes, City Code or common law, including but not limited to, completing the Project itself or through another contractor. The Contractor shall pay the City for all additional costs incurred by the City to obtain substitute performance. The Contractor shall be entitled to payment for that portion of the work that the Contractor completed according to the Contract, less the City's costs to obtain substitute performance for the balance of the work.

3.14.5 If the City terminates the Contract pursuant to Section 3.14.3, the City shall pay Contractor for that portion of the work the Contractor has completed according to the Contract, plus Contractor's cost for materials ordered and delivered to the site before Contractor receives the City's notice of termination; provided that such materials shall then belong to the City.

3.15 Contractor's Right to Stop Work or Terminate Contract. The Contractor may suspend work or terminate the Contract upon ten (10) calendar days written notice to the City, for any of the following reasons:

3.15.1 If an order of any court or other public authority caused the work to be stopped or suspended for a period of ninety (90) calendar days through no act or fault of the Contractor or his employees;

3.15.2 If the City should fail to act upon any request for payment within thirty (30) calendar days after its approval by the Project Manager; or

3.15.3 If the City should fail to pay the Contractor any sum within thirty (30) calendar days after its award by arbitrators.

3.16 Rights of Various Interests. Wherever work being done by the City's forces is contiguous to work covered by the Contract, the respective rights of the various interests involved shall be established by the Project Manager to secure the completion of the various portions of the work in general harmony.

3.17 Subcontracts.

3.17.1 The Contractor shall not be permitted to subcontract any of the work to be performed under the Contract without the written consent of the City, submission of the First-Tier Subcontractor Disclosure Form as required prior to the Bid opening deadline and verification that the Subcontractor has filed a Public Works Bond, when required, with the Construction Contractors Board prior to beginning

any work on the Project. The Contractor shall not employ any subcontractor that the Project Manager may object to due to subcontractor lacking the capability of performing work of the type and scope anticipated. No changes will be allowed from the approved subcontractor list without approval of the Project Manager.

3.17.2 The Contractor agrees to be as fully responsible to the City for the acts and omissions of the Contractor's subcontractors or of any persons either directly or indirectly, employed by Contractor's subcontractors as Contractor is for the acts and omissions of persons directly employed by Contractor.

3.17.3 Nothing contained in the Contract Documents shall create any contractual relation between any subcontractor and the City.

3.18 Unforeseen Difficulties. The Contractor shall protect the work and materials from damage due to the nature of the work, the elements, carelessness of other contractors or from any cause whatever until completion and acceptance of the Project. All loss or damages arising out of the nature of the work to be done under the Contract Documents, from any unseen obstruction or defects which may be encountered in the prosecution of the work, or from the action of the elements, shall be sustained by the Contractor.

3.19 Work During an Emergency. The Contractor shall be responsible for and must have resources available for all emergency work which might occur on the Project under construction for which the Contractor is responsible. The Contractor shall perform any work and furnish and install any materials and equipment necessary during an emergency endangering life or property. In all cases the Contractor shall notify the Project Manager of the emergency as soon as practicable, but the Contractor shall not wait for instructions before proceeding to properly protect both life and property.

3.20 Oral Agreements. No oral order, objection, claim or notice by any party to the others shall affect or modify any of the terms or obligations contained in any of the Contract Documents. No provision of the Contract Documents shall be held to be waived or modified by reason of any act whatsoever, other than by a definitely agreed waiver or modification thereof in writing. No evidence shall be introduced in any proceeding of any other waiver or modification.

3.21 Liens and Claims Against Contractor. The Contractor shall not permit any lien or claim to be filed or prosecuted against the City on account of any labor or material furnished under this Contract whether the same be furnished by the Contractor or any Subcontractor. If the Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to the Contractor or a Subcontractor by any person in connection with the Contract as such claim becomes due, the City may pay such claim to the person furnishing the labor or services and charge the amount of the payment against funds due or to become due to the Contractor under this Contract. The payment of a claim in this manner does not relieve the Contractor or its surety from obligation with respect to any unpaid claims.

Any claim, by a person claiming to have supplied labor or materials for the performance of the work, for payment asserted against the Contractor’s payment bond must be asserted in conformity with ORS 279C.600 et. Seq.

4. MATERIALS AND WORKMANSHIP

4.1 Materials to be Reviewed Before Use.

4.1.1 Only materials conforming with the specified requirements and conditionally accepted by the Project Manager shall be used in the Project.

4.1.2 Before any material to be used in the Project is delivered, the Contractor shall advise the Project Manager of the source from which the material is to be obtained, furnish such samples as may be required for testing purposes, and receive the Project Manager's conditional acceptance for the use of that particular material. The conditional acceptance of any source of supply by the Project Manager does not imply that all material from that source will be accepted. Should material from any conditionally accepted source fail to maintain a quality meeting the requirements of the Specifications, use of material from that source shall be discontinued and the Contractor shall furnish acceptable material from other sources. Regardless of the source, any material delivered for the Project which fails to meet the requirements will be rejected. Only material meeting all requirements will be allowed to be incorporated in the Project. Any material or item incorporated in the Project which does not meet requirements of the Contract Documents, even if it was used with the consent and/or the presence of an inspector, shall be removed and acceptable material shall be used in its place, with all costs related to such removal and installation being borne by the Contractor.

4.1.3 Any material which, after conditional acceptance, has for any reason become unsuitable for use shall be rejected and not used.

4.2 Tests of Materials.

4.2.1 All tests of materials shall be made in accordance with acceptable methods as described and designated in the Specifications. When tests of materials are required, such tests shall be made by a testing laboratory accepted by the Project Manager and at the expense of the Contractor. The Contractor shall afford such facilities as may be required for collecting and forwarding samples and shall hold the materials represented by the samples until tests have been made and the materials found equal to the requirements of the Specifications or to approved samples. The Contractor in all cases shall furnish the required samples without charge.

4.2.2 In the absence of any definite Specification or reference to a Specification in the Technical Specifications or in the Special Provisions for the particular Project involved, it shall be understood that such materials shall meet the Specifications and requirements of the American Society for Testing Materials. Unless otherwise specified, all tests of materials shall be made in accordance with the methods prescribed by the American Society for Testing Materials.

4.2.3 In cases where compliance of materials or equipment with Contract requirements is not readily determinable through inspection and tests, the Project Manager shall request the Contractor provide properly authenticated documents, certificates or other satisfactory proof of compliance. These documents, certifications and proofs must cover performance characteristics, materials or construction and the physical or chemical characteristics of materials.

4.2.4 If the Specifications require, or the Contractor's request is approved by the Project Manager, inspection or testing may take place away from the job site. The additional cost to the City for such remote inspection or testing includes travel and subsistence expenses and will be paid by the Contractor through a reduction in payment to the Contractor equal to the travel and subsistence expenses. In the event the remote inspection or testing is not specified and is required by the City, the required travel and subsistence expense will be paid for by the City.

4.3 Storage of Materials. Materials shall be so stored as to insure the preservation of their quality and fitness for the Project. When considered necessary, they shall be placed on wooden platforms or other hard, clean surfaces, and not on the ground, and/or they shall be placed under cover. Stored materials shall be located so as to facilitate prompt inspection. Private property shall not be used for storage purposes without the written permission of the City and the private property owner.

4.4 Character of Workers. The Contractor shall at all times be responsible for the conduct and discipline of Contractor's employees and/or any subcontractor or persons employed by subcontractors. All workers must have sufficient knowledge, skill and experience to properly perform the work assigned to them. Any foreman or worker employed by the Contractor or Subcontractor who, in the opinion of the Project Manager, does not perform the work in a skillful manner, appears to be incompetent or acts in a disorderly or intemperate manner shall, at the written request of the Project Manager, be removed from work on any portion of the Project except as allowed by the Project Manager.

4.5 Construction Means, Methods, Techniques, and Procedures. The Contractor shall have the full power and authority to select the means, methods, techniques and procedures for performing the work covered under the Contract, provided said means, methods, techniques and procedures are in strict compliance with the requirements of all local, state and federal authorities and with these Specifications, and are not in conflict with the recommended installation practices of the manufacturers who are the suppliers of the materials to be utilized on the contemplated Project. The construction means, methods, techniques and procedures utilized shall produce a satisfactory quality of workmanship and shall be adequate to maintain the schedule of progress as required under the provisions of these Specifications.

4.6 Contractor's Tools and Equipment. The Contractor's tools and equipment used on the work covered under the Contract shall be furnished in sufficient quantity and of a capacity and type that will safely perform the work specified, and shall be maintained and used in a manner that will not create a hazard to persons or property, or cause a delay in the progress of the work.

4.7 Rejected Materials and Work. Any material supplied by the Contractor which is condemned or rejected by the Project Manager or the Project Manager's authorized representative because of non-conformity with the Contract Documents shall be removed at once from the vicinity of the Project by the Contractor at his own expense, and the same shall not be used on the Project. Any defective work whether the result of poor workmanship, use of defective materials, damage through carelessness or any other cause shall be removed within ten (10) calendar days after written notice is given by the Project Manager, and the work shall be re-executed by the Contractor at his own expense.

4.8 Unnoticed Defects. Any defective work or materials furnished by the Contractor and discovered by the Project Manager before the Project has been given final acceptance or final payment has been made, or during the guarantee period, shall be removed and replaced by work and materials which shall conform to the provisions of the Contract Documents. Failure on the part of the Project Manager or his representative to condemn or reject bad or inferior work or materials shall not be construed to imply acceptance of such work or materials.

4.9 Right to Retain Imperfect Work. If any part or portion of the work done or material furnished by the Contractor under the Contract proves to be defective and not in accordance with the Plans and Specifications, and if the imperfection in the same is not of sufficient magnitude or importance as to make the work dangerous or unsuitable, or if the removal of such work will create conditions which are dangerous or undesirable, the City shall have the right and authority to retain such work but shall make such deductions in the payment therefore as may be just and reasonable.

4.10 Correction of Defective Work. When, and as often as the Project Manager determines through its inspection procedures, material, equipment or workmanship incorporated in the Project do not meet the requirements of the Contract, the Project Manager may give notice of the noncompliance to the Contractor in writing. Within five (5) calendar days of receipt of such notice, the Contractor shall undertake all work necessary to correct the deficiency and to comply with the Contract. The Contractor agrees to pay all costs of correcting the defective work, including wages and overhead charges for inspection. If the Contractor disagrees with the Project Manager’s determination and believes the corrective work should be covered by a Change Order, the Contractor shall immediately notify the City, in writing, setting forth the basis for its position. The City will review the matter and notify the Contractor, in writing, of its determination within thirty (30) calendar days after receipt of the Contractor’s notification. If the City determines the corrective work is required to comply with the Contract, the Contractor shall proceed with such work.

As a condition precedent to the Contractor’s claim for either additional compensation or time extension or both resulting from the performance of such corrective work, the Contractor shall, within fifteen (10) calendar days after receipt of the City’s determination, notify the City in writing of its intent to claim additional compensation, time or both. The Contractor shall document all cost information associated with the corrective work and shall submit such information to the Project Manager on a monthly basis. Receipt of the cost data by the Project Manager does not constitute an

Acceptance of the corrective work or an authorization for a Change Order to cover the corrective work.

4.11 Cutting and Patching. The Contractor shall do, or be responsible for, all cutting, fitting or patching that may be required by, shown on or reasonably implied by the Plans and Specifications. Any defective work performed or material furnished by the Contractor, which is discovered by the Project Manager before final acceptance of the Project or before final payment has been made, shall be removed and replaced or patched at the Contractor's expense in a manner approved by the Project Manager or his representative.

4.12 Cleanup.

4.12.1 As the Project progresses and immediately after completion of the Project, the Contractor shall clean up and remove all refuse and unused materials of any kind resulting from the Project. If the Contractor fails to commence the cleanup within 24 hours after being directed to do so by the Project Manager, the Project Manager may have the cleanup performed by others. The cost shall be borne by the Contractor and may be deducted from payments due or to become due the Contractor.

4.12.2 After the Project is completed and before final acceptance of the Project, all areas affected by the Project shall be neatly finished and all equipment, temporary structures, rubbish and waste shall be removed from the Project area.

4.13 Guarantee.

4.13.1 The Contractor shall fully warrant all work for at least one (1) full calendar year from the City's Final Acceptance of the Project, regardless of the length of manufacturers' or installers' warranties.

4.13.2 In addition to any other warranties that are required, the Contractor shall make all necessary repairs and replacements to remedy any and all defects, breaks or failures of the work occurring within one (1) calendar year following the date of the City's Final Acceptance due to faulty or inadequate materials or workmanship. Such repairs and replacements must conform to the Contract Specifications under which the Contractor originally performed the work.

4.13.3 In the event of a dispute regarding any portion of the work, the Contractor shall nonetheless provide any warranty service, repairs or replacements as described in Paragraphs 4.13.1 and 4.13.2 above, for that portion of the work that is not in dispute. In the event a dispute delays the City's Final Acceptance of the work, the warranty for portions of the work not in dispute runs from the date of the City's Final Acceptance of the remaining portions of the work.

4.13.4 The Contractor shall also repair any damage or remedy any disturbance to other publicly owned property or improvements thereon if caused by the Contractor's work and if the damage or remedy occurs during the warranty period.

4.13.5 If the Contractor performs warranty work, then the warranty work for repetitive defects in materials, workmanship or equipment also shall have a one (1) calendar year warranty period from the date of its completion and the City's Final Acceptance of that work. The Contractor shall continue to provide warranty work pursuant to the terms of the Contract until the defects are completed and the City provides notice of its Final Acceptance of the work.

4.13.6 The City shall provide the Contractor with written notice of the need to perform warranty work unless it is determined that an emergency exists, that delay would cause serious additional loss or damage, or if any delay in performing the work might cause injury to any member of the public. If the Contractor, after written Notice, fails within ten (10) calendar days to comply with the City's request, the City has the right to perform the warranty work either by hiring another Contractor or by using its own forces. In either event, the Contractor and its Surety remain liable to the City for the cost of the work performed and any additional damage suffered by the City.

4.13.7 The Contractor shall provide a bond during the one (1) calendar year warranty period to guarantee the Contractor's performance of warranty work. The Contractor shall provide to the City a bond in the amount of 20% of the final Contract Amount in one of the following ways:

4.13.7.1 Continuance of the Contract performance and payment bond.

4.13.7.2 Any new performance and payment bond, acceptable to the City, which covers the Contractor's warranty obligations imposed by the Contract Documents.

4.13.7.3 Cash deposit to the City Finance Department. A receipt from the City Finance Director constitutes proof of the deposit.

4.13.7.4 Other arrangements proposed by the Contractor that the City finds acceptable in the City's sole discretion.

5. INSURANCE, LEGAL AND FINANCIAL RESPONSIBILITY, AND PUBLIC SAFETY

5.1 Insurance.

5.1.1 Policy Requirements. The insurance policies specified herein shall be approved as to form by the City. Contractor shall deliver a certificate of all required policies to City upon execution of the Contract Documents and prior to commencement of any work under the Contract. If requested by the City, Contractor shall furnish the City with executed copies of such policies of insurance. Coverage provided by the Contractor must be underwritten by an insurance company deemed acceptable to the City. Insurance coverage shall be provided by companies admitted to do business in Oregon and rated A- or better

by AM Best. A thirty (30) day notice of cancellation, termination or non-renewal in coverage clause shall be included in all insurance policies. Failure to maintain any required insurance coverage in the minimum required amount shall constitute a material breach of the Contract and shall be grounds for immediate termination of the Contract. If the insurer is unwilling or unable to provide such commitment, the Contractor shall provide the City with the relevant sections of its policies describing how the insurer may reduce, modify or cancel the insurance. Furthermore, the Contractor has an affirmative duty to provide the City with any notice the Contractor receives regarding the reduction, modification or cancellation of its insurance within 24 hours of Contractor's receipt of such notice. All policies required by these provisions shall:

5.1.1.1 also name the City as an additional insured, protecting City from any and all claims, losses, actions or omissions of Contractor or as a result of the joint concurring or contributory act, omission or negligence of Contractor and City arising with or related to activities specified under the Contract;

5.1.1.2 be written as primary policies, not contributing with, or in excess of, any coverage City may have; and

5.1.1.3 have loss payable clauses in favor of and reasonably satisfactory to City.

5.1.2 Commercial General Liability Insurance. During the performance of the Contract, Contractor shall obtain and maintain continuously in effect a commercial general liability insurance policy, including personal and advertising injury liability and products, completed operations and construction site coverage, with a combined single limit per occurrence of not less than $2,000,000.The aggregate limit shall not be less than $4,000,000.The policy shall be endorsed to state that the aggregate limit of liability shall apply separately to the Contract. Coverage may be written in combination with Commercial Automobile Liability Insurance with separate limits for Commercial General Liability and Commercial Automobile Liability. If available, such policy shall contain a contractual liability endorsement to cover Contractor's indemnification obligations under the Contract. Claims Made policies will not be accepted.

5.1.3 Commercial Automobile Liability Insurance. At all times during the term of the Contract, and at the sole expense of Contractor, Contractor shall maintain continuously in effect, "Symbol 1" commercial automobile liability coverage covering all owned, non-owned and hired vehicles. This coverage may be written in combination with the Commercial General Liability Insurance with separate limits for Commercial Automobile Liability and Commercial General Liability. Combined single limit per occurrence shall not be less than $2,000,000. If this coverage is written in combination with the Commercial General Liability, the aggregate limit for Commercial General Liability shall not be less than $4,000,000 and the policy shall be endorsed to state that the aggregate limit of Commercial General Liability shall apply separately to the Contract.

5.1.4 Workers Compensation. At all times during the term of the Contract, and at the sole expense of the Contractor and Subcontractors, the Contractor and all Subcontractors shall comply with ORS 656.017, which requires them to provide Workers Compensation coverage for all their subject workers.

5.1.5 Pollution Liability. Contractor or appropriate Subcontractor shall obtain, at their expense, and keep in effect during the term of the Contract, Pollution Liability Insurance covering their liability for bodily injury, property damage and environmental damage resulting from sudden accidental or gradual pollution and related cleanup costs incurred by the Contractor or appropriate Subcontractor, all arising out of the work or services (including the transportation risk, when applicable) to be performed under the Contract. Combined single limit per occurrence shall not be less than $2,000,000, with an annual aggregate limit of not less than $4,000,000. If available, such policy shall contain a contractual liability endorsement to cover Contractor's indemnification obligations under the Contract. Claims Made policies will not be accepted.

5.2 Indemnification. The Contractor shall hold the City harmless from, and indemnify it for, all loss, costs, claims, demands, damages, suits, actions and judgments for property damage and/or personal injury, including death, arising out of the Project or performance under the Contract by the Contractor's agents or employees, or any of them. In any event any such action or claim is brought against City, Contractor shall, if City so elects, upon tender by City, defend the same at Contractor's sole cost and expense, promptly satisfy any judgment adverse to City or to City and Contractor jointly and reimburse City for any loss, costs, damage or expense (including legal fees) suffered or incurred by City.

5.3 Taxes and Charges. The Contractor shall pay state and local sales and use taxes on all items as required by the laws and statutes of the state and its political subdivisions. The Contractor shall withhold and pay any and all withholding taxes, whether state or federal; pay all social security charges and state unemployment compensation charges; and pay or cause to be withheld, as the case may be, any and all taxes, charges, fees or sums whatsoever which are now or may hereafter be required to be paid or withheld under the laws.

5.4 Bid Bond, Payment Bond, Performance Bond and Public Works Bond.

5.4.1 Contracts for Under $25,000.00. Except when required by the Purchasing Agent, and except for public improvement contracts, bids on all public contracts under twenty-five thousand dollars ($25,000.00) are exempt from the requirements for a Bid Bond, a Performance Bond to assure performance of the Contract and a Payment Bond to assure payment of the obligations incurred in the performance of the Contract. The Information for Bidders shall state when Bonds are required for contracts under $25,000.00.

5.4.2 Contracts for $25,000.00 or More. Except for public improvement contracts, or except when waived by the Council, bids on all public contracts of twenty-five thousand dollars ($25,000.00) or more, shall be accompanied by a

Bid Bond, and the Contractor shall post a Performance Bond to assure performance of the Contract and a Payment Bond to assure payment of the obligations incurred in the performance of the Contract. The Information for Bidders shall state when the requirement for Bonds have been waived for contracts of $25,000.00 or more.

5.4.3 Public Improvement Contracts & Contracts for Highways, Bridges and Other Transportation Projects:

5.4.3.1 Bids on Public Improvement contracts for one hundred thousand dollars ($100,000.00) or less, and contracts for highways, bridges and other transportation projects for fifty thousand dollars ($50,000.00) or less, are exempt from the requirement of a Bid Bond, a Performance Bond and a Payment Bond.

5.4.3.2 Bids on Public Improvement contracts for more than one hundred thousand dollars ($100,000), and contracts for highways, bridges and other transportation projects for more than fifty thousand dollars ($50,000), must be accompanied by a Bid Bond, Performance Bond and Payment Bond.

5.4.4 Emergency Contracts. For all contracts awarded under Roseburg Municipal Code Subsection 3.06.025(F), the City Council or the Purchasing Agent may waive the requirements for Bid Bond, the Payment Bond and the Performance Bond. Upon receiving the Purchasing Agent's report regarding the emergency conditions necessitating waiver, as required by Roseburg Municipal Code Subsection 3.06.025(F), the Council may modify or reject the Purchasing Agent's decision to waive Bond requirements.

5.4.5 Public Works Bond. Before beginning work on a public works contract, a contractor or subcontractor, unless exempt under ORS 279C.800 to 279C.870, shall submit a $30,000 Public Works Bond to the Construction Contractors Board and certify to the City that such Bond has been submitted. In case of an emergency, or when the City’s interest or property would probably suffer material injury by delay or other cause, the requirement to file a Public Works Bond may be excused if the Purchasing Agent has declared an emergency under Roseburg Municipal Code Section 3.06.025.

5.4.6 Submittal and Return of Bid Bonds. When required by the above Subparagraphs, the Bid Bond shall accompany the bid in the form of cash, certified check, cashier's check, irrevocable letter of credit or Bid Bond in a form approved by City, and in an amount equal to ten percent (10%) of the total amount of the bid. There shall be no exceptions to this provision. All required Bid Bonds, excepting that of the Contractor submitting the successful bid, will be returned within thirty (30) calendar days after the Contract has been awarded. The Bid Bond from the successful Contractor will be retained until bidder has entered into a satisfactory Contract with the City, and when required, furnished a Performance Bond to assure performance of the Contract, a Payment Bond to assure payment

of the obligations incurred in the performance of the Contract and the Public Works Bond Confirmation form executed by the Contractor. Should the successful bidder fail or refuse to execute the Contract and/or furnish the Payment Bond, Performance Bond or Public Works Bond Confirmation form as required, the Bid Bond deposited by said bidder shall be retained as liquidated damages by the City.

5.4.7 Bond Form. The form of all bonds required by the City shall be as the City may prescribe, and shall be with a Surety company satisfactory to the City and authorized to do business in the State of Oregon. Bonds shall be in force for one year after acceptance of the completed Project to cover all guarantees against defective materials and workmanship and all claims by subcontractors or third parties for services or materials provided to Contractor or Contractor's Subcontractors.

5.5 Royalties and Patents. The Contractor shall pay all royalty and license fees, unless otherwise specified. The Contractor shall defend all suits or claims for infringement of any patent rights and shall save the City and the Project Manager harmless from loss on account thereof.

5.6 Permits and Licenses.

5.6.1 The Contractor shall apply for and obtain, but the City shall cover the cost of, all rights-of-way permits, easements, franchises, highway crossing permits and railroad crossing permits as required. The Contractor shall comply with all specifications or requirements stipulated in the permits granted to the City.

5.6.2 The Contractor shall obtain at Contractor's expense, all other permits (such as building permits, burning permits, blasting permits and safety permits), licenses and inspection fees necessary for construction purposes as required by appropriate local, county, state or federal laws and/or ordinances. The Contractor shall also be registered to do business with the City of Roseburg prior to beginning work on the Contract.

5.7 Laws to be Observed. The Contractor shall keep fully informed of all local and county ordinances, state and federal laws in any manner affecting the Project herein specified. Contractor shall at all times comply with said ordinances, laws and regulations, and the City's Standard Contract Provisions in Exhibit "A" of the Construction Contract; and protect and indemnify the City and City's officers and agents against any claim or liability arising from or based on the violation of any such laws, ordinances, provisions or regulations.

5.8 Safety.

5.8.1 The Contractor will be solely and completely responsible for conditions of the jobsites, including safety of all persons and property during work on the Project. This requirement will apply continuously and not be limited to normal working hours. Safety provisions shall conform to all applicable federal, state, county and local laws, ordinances and codes. The Contractor shall comply with

ORS 279C.505(2) drug testing program requirements at all times throughout the completion of the Project.

5.8.2 The Contractor shall also comply with the "U.S. Department of Labor Occupational Safety and Health Act", the "Construction Safety Act" administered by the U.S. Department of Labor, and the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, except where these are in conflict with state laws, in which case the more stringent requirement must be followed.

5.8.3 Contractor shall comply with all federal, state and local safety requirements, including but not limited to regulations pertaining to health hazard notification, control of hazardous energy, use of hazardous substances, handling and disposal of hazardous waste, removal and disposal of asbestos, entry into and work in confined spaces and handling of materials containing lead. City will notify Contractor of any hazardous conditions of which City is aware and will provide Contractor with information about City's safety and hazard notification programs. Such notification from the City does not relieve Contractor of any responsibility under the Contract or under federal or state statute, regulation or common law to inform itself of existing and potential hazards, to communicate those hazards to its employees, and to use all reasonable steps to minimize the risk of harm to its employees, other workers and the public.

5.8.4 The Contractor shall maintain at the jobsite all articles necessary for giving first aid to the injured and shall establish the procedure for the immediate removal to a hospital or a doctor's care of persons (including employees) who may be injured on the jobsite.

5.8.5 The duty of the Project Manager to conduct construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures in, on or near the construction sites.

5.8.6 If death, serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Project Manager and the City. In addition, the Contractor must promptly report in writing to the Project Manager all accidents whatsoever arising out of, or in connection with, work on the Project or adjacent to the sites, giving full details and statements of witnesses.

5.8.7 If any claim is made by anyone against the Contractor or any Subcontractor because of any accident, the Contractor shall promptly report the facts in writing to the Project Manager, giving full details of the claim.

5.9 Equal Opportunity Clause. The provisions of Executive Order 11246 of September 24, 1965, and the Rules and Regulations issued therein are hereby incorporated by reference, and the Contractor agrees, by acceptance of the Contract, to comply with such Executive Order, rules, regulations and amendments thereto, to the extent the same are applicable to the contracting and/or subcontracting of services or work hereunder.

5.10 Warning Signs and Barricades. The Contractor shall provide adequate signs, barricades and lights and take all necessary precautions for the protection of the work under the Project and the safety of the public. All barricades and obstructions shall be protected at night by signal lights which shall be kept burning from sunset to sunrise. Barricades shall be of substantial construction and shall be painted white or whitewashed to increase their visibility at night. Suitable warning signs shall be so placed and illuminated at night as to show in advance where construction, barricades or detours exist.

5.11 Flaggers. In addition to furnishing and maintaining adequate signs, barricades and lights, the Contractor is required to furnish any and all flaggers that are required to control traffic. The City is hereby specifically exempted from furnishing any flaggers for the Project. If flaggers are required on any jobsite, they shall be supplied by the Contractor at no additional cost to the City.

5.12 Public Safety and Convenience. The Contractor shall at all times conduct work on the Project so as to insure the least possible obstruction to traffic and inconvenience to the general public and residents in the vicinity of the Project, and to insure the protection of persons and property in a manner satisfactory to the Project Manager. No road or street shall be closed to the public except with the permission of the Project Manager and proper governmental authority. Temporary provisions shall be made by the Contractor to insure the use of sidewalks and the proper functioning of all gutters, sewer inlets, drainage ditches and irrigation ditches, which shall not be obstructed except as approved by the Project Manager.

5.13 Protection of Work and City's Property. The Contractor shall at all times safely guard the City's property and equipment from injury or loss in connection with Contractor's work under the Contract. The Contractor shall at all times safely guard and protect the Project and adjacent property (as provided by law and the Contract Documents) from damage. Contractor shall be responsible for any damage to the City's property and equipment which is a result of the Contractor's negligence.

5.14 Sanitary Provisions. The Contractor shall provide and maintain such sanitary accommodations for the use of its employees and those of its subcontractors as may be necessary to comply with the requirements and regulations of the local and state departments of health and as directed by the Project Manager.

5.15 Payment of Prevailing Wages on Public Works in Oregon.

5.15.1 The Contractor and all Subcontractors on the Project shall pay not less than the "prevailing rate of wage" as that term is defined in ORS 279C.800 to 279C.870, and if applicable, the Federal Prevailing Wage required under the Davis-Bacon Act (40 U.S.C. 3141 - 3148), whichever is higher. The determination and application of such prevailing rate of wage is provided for in ORS 279C.800 through 279C.870, and if applicable, the Davis-Bacon Act (40 U.S.C. 3141 - 3148).

5.15.2 If the Bureau of Labor has made no determination of the prevailing rate of wage, it shall be the obligation of the Contractor to determine the same by making application to the Bureau of Labor or otherwise.

5.15.3 The Contractor or the Contractor's surety and every Subcontractor or the Subcontractor's surety shall file certified statements with the City in writing using the form prescribed by the Commissioner of the Bureau of Labor and Industries certifying the hourly rate of wage paid each worker whom the Contractor or the Subcontractor has employed in the work under this Contract and further certifying that no worker employed upon such public work has been paid less than the prevailing rate of wage or less than the minimum hourly rate of wage specified in this Contract. The certified statement shall be verified by the oath of the Contractor or the Contractor's surety or Subcontractor or the Subcontractor's surety that the Contractor or Subcontractor has read the certified statement and knows the contents thereof and that the same is true to the Contractor's or Subcontractor's knowledge. The certified statements shall set out accurately and completely the payroll records for the prior week including the name and address of each worker, the worker's correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wages paid.

5.15.4 Each certified statement shall be delivered or mailed by the Contractor or Subcontractor to the City. A true copy of the certified statement shall also be filed at the same time with the Commissioner of the Bureau of Labor and Industries. Certified statements for each week during which the Contractor or Subcontractor employs a worker upon the public work shall be submitted once a month, by the fifth business day of the following month. Information submitted on certified statements may be used only to ensure compliance with the provisions of ORS 279C.800 to 279C.870 or the Davis-Bacon Act (40 U.S.C. 3141 - 3148), whichever applies.

5.15.5 As provided by ORS 279C.810, the contract amount threshold for application of the state prevailing wage rate law is $50,000.00.

5.16 Subcontractor and Supplier Agreements. The Contractor shall include in its subcontracts for property or services entered into by the Contractor and a first-tier subcontractor, including a material supplier, for the purpose of performing the Contract:

5.16.1 A payment clause that obligates the Contractor to pay the first-tier subcontractor for satisfactory performance under its subcontract within ten (10) calendar days of payment by the City out of such amounts as are paid to the Contractor by the City under the Contract; and

5.16.2 An interest penalty clause that obligates the Contractor, if payment is not made within thirty (30) calendar days after receipt of payment from the City, to pay to the first-tier subcontractor, an interest penalty on amounts due in the case of each payment not made in accordance with the payment clause included in the subcontract pursuant to this requirement. The Contractor or first-tier subcontractor shall not be obligated to pay an interest penalty if the only reason that the Contractor or first-tier subcontractor did not make payment when

payment was due, is that the Contractor or first-tier subcontractor did not receive payment from the City or Contractor when payment was due. The interest penalty shall be:

5.16.2.1 For the period beginning on the day after the required payment date and ending on the date on which payment of the amount is made; and

5.16.2.2 Computed at the rate specified in ORS 279C.515(2).

5.16.3 The Contractor shall include in each of its subcontracts, for the purpose of performance of the Contract condition, a provision requiring the first-tier subcontractor to include a payment clause and an interest penalty clause conforming to the standards set forth in this section and requiring each of its subcontractors to include such clauses in their subcontracts with lower-tier subcontractors or suppliers.

5.16.4 None of the provisions of this section are intended to prevent the Contractor or any subcontractor from including in its contracts, the provision described in ORS 279C.580 (5) and (6).

5.17 Application for and Processing of Subcontractor and Supplier Payments. The Contractor shall provide each first-tier Subcontractor, including a material supplier, with a standard form that the first-tier Subcontractor may use as an application for payment or as another method by which the Subcontractor may claim a payment due from the Contractor. The Contractor, except as otherwise provided in this Subsection, shall use the same form and regular administrative procedures for processing payments during the entire term of the subcontract. The Contractor may change the form or the regular administrative procedures the Contractor uses for processing payment if the Contractor:

5.17.1 Notifies the Subcontractor in writing at least forty-five (45) calendar days before the date on which the Contractor makes the change; and

5.17.2 Includes with the written notice a copy of the new or changed form or a description of the new or changed procedure.

6. PROGRESS AND COMPLETION OF PROJECT

6.1 Contract Time and Commencement of Construction. The Contractor shall be capable of commencing construction on the Project covered under the Contract within ten (10) calendar days after signing of the Construction Contract. The Contract shall be in effect from the time it is signed until the Project is complete and accepted by the City. During periods when weather or other conditions are unfavorable for construction, the Contractor shall pursue only such portions of the work that will not be damaged thereby. Contractor shall not construct any portion of the work during the time unfavorable conditions exist that are likely to adversely affect the quality or efficiency of the work. It is expressly understood and agreed by and between the Contractor and the City that the Contract time specified for completion of the work described herein is a reasonable

time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the work.

6.2 Preconstruction Conference. A preconstruction conference will be scheduled by the City prior to commencement of construction. The Contractor will be notified of the time and place of this conference and shall be required to attend. Ten (10) calendar days prior to the preconstruction conference, the Contractor shall provide to the Project Manager four (4) copies of a project work schedule for review and approval. The Contractor has an affirmative duty to update the construction schedule each time changes occur.

6.3 Prosecution of the Project.

6.3.1 It is expressly understood and agreed that the time of beginning, rate of progress and time of completion of the Project are of the essence of the Contract. The Contractor shall perform the construction of said Project with due diligence and at such a rate and in such a manner as, in the opinion of the Project Manager, is necessary for completion within the time set forth in Paragraph 4 of the Contract.

6.3.2 After commencement of construction on the Project by the Contractor, if the Contractor is delayed by reason of the failure of the City to provide sufficient materials for construction thereof or to provide continuous open right-of-way, then the completion date of said Project shall be extended to the extent that the Contractor is delayed in carrying on said Project by reason of such failure on the part of the City.

6.3.3 The Contractor shall arrange its work and dispose of materials so as to insure the least possible interference and inconvenience to the landowners on or beside whose property the construction is taking place, or to the public where the construction lies in or near a public thoroughfare. Contractor shall employ only such number of construction crews as are reasonably necessary to construct said Project within the allotted time. The City may require the employment of an additional crew or crews, if in its judgment it is necessary in order to complete said Project with the time required.

6.3.4 If the Contractor desires to carry on work at night or outside the regular hours, timely notice shall be given to the Project Manager to allow satisfactory arrangements to be made for inspecting the Project in progress.

6.4 Provisions for Delays:

6.4.1 Notice of Delays. Whenever the Contractor foresees any delay in the prosecution of the work, and in any event, immediately upon the occurrence of any delay which the Contractor regards as unavoidable, Contractor shall notify the Project Manager in writing on the probability of the occurrence of such delays, the probable duration and cause. The Contractor shall take immediate steps to prevent the occurrence or continuance of the delay. If this cannot be done, the Project Manager shall determine how long the delay will probably continue and

to what extent the prosecution and completion of the work are being delayed thereby. The Project Manager shall also determine whether the delay is to be considered avoidable or unavoidable and shall notify the Contractor of his/her determination. The Contractor shall not make a claim for delays that are not called to the attention of the Project Manager at the time of their occurrence.

6.4.2 Avoidable Delays Defined. Avoidable delays in the prosecution or completion of the work include, but are not limited to:

6.4.2.1 All delays that could have been avoided by the exercise of care, prudence, foresight and diligence on the part of the Contractor or its Subcontractor;

6.4.2.2 Delays that do not necessarily prevent or delay the prosecution of other parts of the work or the completion of the whole work within the time specified;

6.4.2.3 Reasonable delays resulting from time required by the City and Project Manager for approval of plans submitted by the Contractor and for the making of surveys, measurements, testing and inspections; and

6.4.2.4 Delays arising from interruptions occurring in the prosecution of the work on account of the reasonable interference from other contractors employed by the City which do not necessarily prevent the completion of the whole work within the time specified.

6.4.3 Unavoidable Delays Defined. Unavoidable delays in the prosecution or completion of the work include, but are not limited to, all delays (other than avoidable delays as defined above) that result from causes beyond the control of the Contractor and that could not have been avoided by the exercise of care, prudence, foresight and diligence on the part of the Contractor or its Subcontractors. Delays caused by other contractors employed by the City will be considered unavoidable delays only insofar as they interfere with the Contractor's completion of the work. Delays due to normal weather condition are not regarded as unavoidable delays insofar as they interfere with the Contractor's completion of the work. If the Project Manager determines the Contractor has experienced an unavoidable delay, and further that such delay has affected the controlling operations of the work, the City shall grant to the Contractor an extension of time for Contract performance, not to exceed the number of calendar days of unavoidable delay experienced by the Contractor. The Contractor has no remedy for unavoidable delay except as provided by this paragraph. Delays due to normal weather conditions are not regarded as unavoidable as the Contractor agrees to plan its work with prudent allowances for interference by normal weather conditions. Delays caused by acts of God, fire, unusual storms, flood, earthquakes, epidemics, quarantine restrictions, strikes, labor disputes and freight embargoes are considered unavoidable delays insofar as they interfere with the Contractor's completion of the work. Delays caused by shortages of

materials are considered unavoidable providing the Contractor can prove to the City that the Contractor has made reasonable and timely attempts to secure the material(s).

A rainstorm, windstorm, high water or other natural phenomenon for the specific locality of the work, which might reasonably have been anticipated from historical records of the general locality of the work, do not constitute unusually severe weather. For the purposes of this Contract, rainfall data is assumed to be the same as that measured at the Roseburg Regional Airport by the Environmental Data Service of the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

6.4.4 Time Extension for Delays.

6.4.4.1 Extensions for Avoidable Delays. In case the work is not completed in the time specified, including extensions of time as may have been granted for unavoidable delays, the Contractor will be assessed damages for those costs incurred by the City that are attributable to the fact the work was not completed on schedule. The City may grant an extension of time for avoidable delay if the City deems it in its best interest. The Contractor shall compensate the City, in exchange for granting an extension of time for avoidable delay, for the actual costs to the City of Project management, inspection, general supervision and overhead expenses which are directly chargeable to the work and that accrue during the period of such extension. The actual costs do not include charges for final inspection and preparation of the final estimate by the City.

6.4.4.2 Extensions for Unavoidable Delays. For delays the Contractor considers unavoidable, the Contractor shall submit to the Project Manager, complete information demonstrating the effect of the delay on the controlling operation in its construction schedule. The submission must be made within ten (10) calendar days of the beginning of the occurrence which is claimed to be responsible for the unavoidable delay. The Project Manager shall review the Contractor's submittal and determine the number of calendar days of unavoidable delay, if any, and the effect of such delay on the controlling operations of the work. If the Project Manager determines the Contractor has experienced an unavoidable delay, and further that such delay has affected the controlling operations of the work, the City shall grant to the Contractor an extension of time for Contract performance, not to exceed the number of calendar days of unavoidable delay experienced by the Contractor. The Contractor has no remedy for the unavoidable delay except as provided in this Section. During such extension of time,

neither charges for the inspection nor administration nor damages for delay will be assessed against the Contractor. It is understood and agreed by the Contractor and the City that time extensions due to unavoidable delays involve controlling operations that would prevent completion of the whole work within the specified time.

If the Contractor disagrees with the Project Manager's determination, the Contractor may appeal such determination to the City Manager in accordance with Paragraph 3.4.2.

6.5 Changes in the Project. The City may, as the need arises, order changes in the Project through additions, deletions or modifications without invalidating the Contract. Compensation and time of completion affected by the change shall be adjusted at the time of ordering such change.

6.6 Extra Work. New and unforeseen items of work found to be necessary but which cannot be covered by any item or combination of items for which there is an established Contract price, shall be classified as extra work. Upon written order from the City and approval from the Project Manager, the Contractor shall do such extra work as may be required for the proper completion or construction of the whole Project contemplated. In the absence of such written order, no claim for extra work shall be considered. Extra work shall be performed in accordance with these Specifications where applicable and work not covered by the Specifications or special provisions shall be done in accordance with the best practice as approved by the Project Manager. Extra work required in an emergency to protect life and property shall be performed by the Contractor as required. Contractor shall notify the Project Manager of the emergency as soon as possible, but shall begin work prior to providing notice if immediate work is necessary to protect life or property.

6.7 Unforeseen Difficulties. A delay beyond the Contractor's control occasioned by an act of God, or by strikes, lockouts, fire, etc., may entitle the Contractor to an extension of time to complete the Project as determined by the Project Manager, provided however, that the Contractor shall immediately give written notice to the Project Manager of the cause of such delay. In no event shall the Contractor be entitled under the Contract to collect or recover any damages, loss or expense incurred by any delay other than as caused by the City as stipulated hereinabove in Subsection 6.3 "Prosecution of the Project".

6.8 Use of Completed Portions. The City shall have the right to take possession of and use any completed or partially completed portions of the Project. Such use shall not be considered as final acceptance of any portion of the Project, nor shall such use be considered as cause for an extension of Contract completion time unless authorized by a change order issued by the City.

6.9 Liquidated Damages. If the Contractor fails to complete the work, or any part thereof, in the time agreed upon in the Contract or within such extra time as may have been allowed for delays by extensions granted as provided in the Contract, the Contractor

shall reimburse the City for the additional expense and damage for each calendar day that the Contract remains uncompleted after the Contract completion date. It is agreed that the amount of such additional expense and damage incurred by reason of failure to complete the Contract is the per diem rate as stipulated in the Bid. The amounts are hereby agreed upon as liquidated damages for the loss to the City.

It is expressly understood and agreed that this amount is not to be considered in the nature of a penalty but as damages for delay which have accrued against the Contractor. The exact amount of damage that would be sustained by the City due to delay is difficult, if not impossible, to accurately ascertain, but the parties believe the specified amount of liquidated damages to be a reasonable forecast of the damage for delay that the City would likely sustain. Such liquidated damages are in addition to any other ascertainable damage, other than for delays that the City sustains for Contractor's breach of the Contract. The City may deduct such damages from any amount due, or that may become due the Contractor or the amount of such damages becomes due and may be collected from the Contractor of is Surety.

6.10 Substantial Completion. Substantial Completion shall have the meaning set forth in Subsection 1.1 "Definitions" of these General Conditions.

Upon consideration by the Contractor that a determination of Substantial Completion of the Project, or a designated portion thereof, is completed, the Contractor shall so notify the Project Manager in writing. This notice shall include the Contractor's list of any minor incomplete contract work items to finish the Project. Upon receipt of the written notification, the Project Manager will promptly, by personal inspection, determine the actual status of the work in accordance with the terms of the Contract. If the Project Manager finds that the terms of Substantial Completion of the Contract have not yet been met, the Project Manager will so inform the Contractor. If, instead, the Project Manager determines from the inspection that the work, or the designated portion thereof, has met the terms of Substantial Completion, the Project Manager will issue to the Contractor a "Written Notice of Substantial Completion" along with a Punch List of any deficient work items needing repair or correction. The Contractor agrees to complete all such corrective work within thirty (30) calendar days after submission of the Punch List to the Contractor by the Project Manager. If the Contractor fails to complete the corrective work within the thirty (30) calendar days, the Contractor is liable to the City in the amount stated in the liquidated damages section of the Contract for each day thereafter until all corrective work is completed. The City shall be entitled to deduct liquidated damages from final payment.

6.11 Final Completion. The Contractor shall notify the Project Manager in writing requesting a designation of Final Completion at the completion of the punch list items related to the Substantial Completion designation, and at the completion of any other items necessary to the completion of the Project. The Project Manager will inspect these remaining items, and upon satisfactory completion, will issue a written "Notice of Final Completion" which shall be subject to the City's Final Acceptance. In the event some items are not ready for the City's Final Acceptance the City may, without waiving any of the City's right to the portion(s) of the Project not yet receiving Final Acceptance, nonetheless provide Final Acceptance for those portion(s) of the items of the Project the City deems

appropriate. As stated in Subsection 4.13, the terms of the guarantee commence on the date of the City's Written Notice of Final Acceptance for that portion of the work.

7. MEASUREMENT AND PAYMENT

7.1 General.

7.1.1 All work acceptably completed under the Contract shall be measured by the Project Manager according to United States Standard Measures, and the quantities of work performed or materials furnished shall be computed on the basis of such measurements.

7.1.2 The Contractor shall accept the compensation as herein provided in full payment for furnishing all materials not provided by the City and all labor, tools and equipment; for performing all work under the Contract; for all loss or damage arising from the nature of the Project other than unforeseeable environmental conditions as described in ORS 279C.525, the action of the elements or any unforeseen difficulties which may be encountered during the prosecution of the Project, until its final acceptance by the City.

7.2 Payments. The City shall make monthly progress payments within thirty (30) calendar days from the date of the pay request for work which has been completed and accepted by the City per ORS 279C.570.

7.3 Final Payment. The City shall retain five percent (5%) of all payments until the entire Project has been given Final Acceptance by the City. The entire Project must be accepted by the City prior to releasing retainage. Upon the City's acceptance of the entire Project, the retainage will be released and the Contractor shall be responsible for the workmanship and materials for one year thereafter as provided in Subsection 4.13.

If the contract price exceeds $500,000, the City will place amounts deducted as retainage into an interest-bearing escrow account. Interest on the retainage amount accrues from the date the payment request is approved until the date the retainage is paid to the Contractor.

7.4 City's Right to Withhold Payment. The City may withhold payment in whole or in part on an approved invoice to the extent necessary to protect City from loss due to any of the following causes discovered subsequent to approval of the invoice by the Project Manager or the Project Manager's representative:

7.4.1 Defective work;

7.4.2 Evidence indicating the probable filing of claims by other parties against the Contractor;

7.4.3 Failure of the Contractor to make payments to Subcontractors, material suppliers or workers; or

7.4.4 Damage to another contractor.

7.5 Payment for Uncorrected Work. Should the Project Manager direct the Contractor not to correct work that has been damaged or that was not performed in accordance with the Contract Documents, the City may make an equitable deduction from the amount due to the Contractor on the Project in order to compensate the City for the uncorrected work.

7.6 Payment for Extra Work. In any case where the Contractor deems additional compensation is due Contractor for work or materials not clearly covered in the Contract Documents or not ordered by the Project Manager according to provisions of the Contract Documents, the Contractor shall notify the Project Manager, in writing, of his intention to make a claim in order that such matters may be settled, if possible, or other appropriate action promptly taken. If such notification is not given, or the Project Manager is not afforded proper facilities by the Contractor for keeping strict account of actual cost, then the Contractor hereby waives the claim for such extra compensation. Such notice by the Contractor, and the fact that the Project Manager has kept account of the cost as aforesaid, shall not in any way be construed as proving the validity of the claim. Claims for additional compensation shall be made in itemized detail and submitted, in writing, to the City and Project Manager within ten (10) calendar days following completion of that portion of the Project for which the Contractor makes his claim. In case the claim is found to be just, it shall be allowed and paid under a supplemental agreement to be entered into between the parties to the Contract.

7.7 Release of Liens.

7.7.1 Before the City pays the Contractor for the work included under the Contract, the Contractor shall sign and deliver to the City a release of liens or claims sworn to under oath and duly notarized. The release shall state that the Contractor has satisfied all claims and indebtedness of every nature in any way connected with the Project, including but not limiting the generality of the foregoing, all payrolls, amounts due to subcontractors, accounts for labor performed and materials furnished, incidental services, liens and judgments.

7.7.2 If any lien or claim remains unsatisfied after payment to the Contractor is made, the Contractor shall refund to the City all monies that the City may be compelled to pay in discharging such a lien or claim, including all costs and reasonable attorneys' fees.

7.8 Acceptance of Payment Constitutes Release. The acceptance by the Contractor of a payment for the invoice shall release the City from all claims and liability to the Contractor for all things done or furnished in connection with the work specified on said invoice, and every act of the City and others relating to or arising out of the Project. No payment, however, final or otherwise, shall operate to release the Contractor or his Sureties from obligations under the Contract, the Performance Bond or the Payment Bond as herein provided.

7.9 Correction of Defective Work. The Project Manager's approval of the invoice for work completed and the City's payment to the Contractor on such invoice, shall not relieve the Contractor of the responsibility for faulty materials or workmanship on said work

during the one-year guarantee period as stipulated in Subsection 4.13. The one-year guarantee period for each portion of the Project begins when each portion of the Project receives written notice of Final Acceptance from the City. The City shall promptly give notice of faulty materials or workmanship which are discovered within the one-year guarantee period and the Contractor shall promptly replace any such defects. If the Contractor fails to make the repairs and replacements promptly, the City may do the work, and the Contractor and Contractor's Surety shall be liable for the cost thereof.

8. ENVIRONMENTAL MATTERS

8.1 Contractor Compliance. Contractor shall comply with, and require its Subcontractors to comply with, all applicable federal, state and local statues, ordinances, orders, rules and regulations relating to the protection of human health and environment, including but not limited to, the use, storage, release, spill, disposal or other handling of petroleum products and other hazardous substances.

8.2. Unanticipated Regulatory Compliance and Site Conditions.

8.2.1 If Contractor is delayed or additional work is required due to the enactment of new or an amendment to existing statutes, ordinances or regulations relating to the prevention of environmental pollution and the preservation of natural resources occurring after submission of the successful bid, City may, at its sole discretion:

8.2.1.1 terminate the Contract;

8.2.1.2 complete the Project itself;

8.2.1.3 use non-City forces already under contract with the City;

8.2.1.4 require that the underlying property owner be responsible for the additional work;

8.2.1.5 call for bids for a new contractor to provide the necessary services; or

8.2.1.6 issue Contractor a change order setting forth the additional work that must be undertaken.

8.2.2 If Contractor encounters a condition not referred to in the Contract Documents, not caused by Contractor and not discoverable by a reasonable pre-bid visual site inspection, and such condition requires compliance with the regulations referred to in Paragraph 8.2.1 above, Contractor shall immediately provide City notice of the condition. Except as required by any environmental or natural resource regulation, or, in case of an emergency, Contractor shall not commence work or incur any additional job site costs with regard to the condition encountered without written direction from the City. Upon request, Contractor shall estimate emergency or regulatory compliance costs as well as the

anticipated delay and costs resulting from the encountered condition, and promptly deliver such estimate to City for resolution.

8.2.3 In the event of an occurrence of an unanticipated site condition as described in Paragraph 8.2.2 above, City, within a reasonable period of time, may do any of the following at its sole discretion:

8.2.3.1 terminate the Contract;

8.2.3.2 complete the Project itself;

8.2.3.3 use non-City forces already under contract with the City;

8.2.3.4 require that the underlying property owner be responsible for the additional work;

8.2.3.5 call for bids for a new contractor to provide the necessary services; or

8.2.3.6 issue Contractor a change order setting for the additional work that must be undertaken.

8.2.4 In the event City terminates the Contract under Subparagraph 8.2.1.1 or 8.2.3.1, Contractor shall be entitled to all costs and expenses incurred to the date of the termination, including overhead and reasonable profits, on the percentage of the Project completed. Contractor shall not be entitled to profits or consequential damages on the uncompleted portion of the Contract. If the City chooses to issue a change order or terminate the Contract for either of the reasons set forth in Paragraph 8.2.1 or 8.2.3, Contractor agrees to provide the City access to Contractor's documentation used to prepare Contractor's bid in order to assist City in making the City's determination of the additional compensation to be paid.

9. CHANGE ORDERS.

9.1 Authorized Changes in the Work. Changes to the drawings, specifications, quantities or details of the Project are inherent in the nature of construction and may be necessary or desirable during the course of Project construction. Without impairing or invalidating the Contract, the City may at any time, without notice to any surety, by written order designed or indicated to be a Change Order or a Proposal Request, make any change in the work within the general scope of the Contract, including, but not limited to changes:

9.1.1 In the Plans and Specifications (including drawings and designs);

9.1.2 In the time, method, or manner of performance of the work;

9.1.3 In the City-furnished facilities, equipment, materials, services or site; or

9.1.4 Directing acceleration in the performance of the work.

9.2 Unauthorized Changes in the Work. The Contractor shall not be entitled to an increase in the Contract price or an extension of the Contract times with respect to any work performed that is not required by the Contract Documents as amended, modified or supplemented except in the case of an emergency. In the event of an emergency, the Contractor has seven (7) calendar days to notify the Project Manager of the nature and extent of the emergency. If notification is not provided within seven (7) calendar days, no time adjustment or cost compensation will be allowed.

9.3 Execution of Change Orders. The City and the Contractor shall execute appropriate Change Orders and Proposal Requests and upon receipt of an approved Change Order or Proposal Request, the Contractor shall perform the work as modified. If the Change Order increases the Contract amount, the Contractor shall notify Contractor's Surety of the increase and shall provide the City with a copy of any resulting modification to the Bond documents. Change Order and Proposal Requests shall clearly state all costs and schedule adjustments.

9.4 No Oral Change Orders. No oral order, statement or conduct of the City constitutes a Change Order or entitles the Contractor to an equitable adjustment.

9.5 Change of Contract Price.

9.5.1 The Contract price may only be changed by a Change Order.

9.5.2 The value of any work covered by a Change Order or of any claim for an adjustment in the Contract price will be determined as follows:

9.5.2.1 Where the work involved is covered by the unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved; or

9.5.2.2 Where the work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum; or

9.5.2.3 Where the work involved is not covered by the unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Subparagraph 9.5.2.2, time and materials basis plus the Contractor's fee for overhead and profit as defined in Paragraph 9.5.3.

9.5.3 Percentage Allowances. For work negotiated and completed on a time and materials basis the Contractor's maximum allowable percentage markup of such costs shall be as follows:

Materials	15%
Equipment	15%
Labor	20%

Special Services 15%

9.5.3.1 When a subcontractor performs work under a time and materials Change Order, the Contractor will be allowed a supplemental markup of 5% on the subcontractor's charges.

9.6 Lump Sum Change Orders. Whenever practicable, changes in Contract price resulting from extra work will be determined by a mutually agreed-upon lump sum price. The Contractor's proposal for such changes must include a detailed breakdown of all labor and materials to be performed by its forces and by the forces of its Subcontractors and material suppliers.

Costs for labor, material, rentals, approved services, and for overhead and profit for the Contractor, Subcontractor and material suppliers must be calculated as specified under the Subsection 9.7.

When the City desires a price quotation from the Contractor for a proposed change to the Contract, the Project Manager will issue a Proposal Request describing the proposed changes. The Contractor shall respond with a price quote within ten (10) calendar days of the issuance of the Proposal Request.

Contractor's quotations for Change Orders and Proposal Requests must be in writing and firm for a period of thirty (30) calendar days. Any compensation paid in conjunction with the terms of a Change Order compromises the total compensation due the Contractor for the modification defined in the Change Order. By signing the Change Order or Proposal Request, the Contractor acknowledges that the stipulated compensation includes payment for the modification plus all payment for the interruption of schedules, extended overhead, delay or any other impact claim or ripple effect, and by such signing specifically waives any reservation or claim for additional compensation or claim for Contract time extension in respect to the subject Change Order or Proposal Request.

The City's request for quotations on modifications to the work is not considered authorization to proceed with the work prior to the approval of a formal Proposal Request or Change Order, and such request does not justify any delay in existing work.

9.7 Time and Material Change Orders. Whenever the Contractor is directed by written notice from the Project Manager as the City's representative, to perform extra work on a time and material basis, the Contractor shall furnish labor, equipment and materials necessary to complete the work in a satisfactory manner and within a reasonable period of time. For the work performed, payment will be made for the documented actual necessary expense of the following:

9.7.1 Field and office labor, including estimating and procurement personnel and foremen, who are directly assigned to the time and materials work (actual payroll cost, including wages, fringe benefits as established by law). The cost of labor includes any employer payment to or on behalf of the worker for health and welfare, pension, vacation and similar purposes. Where subsistence and travel allowances are required for performance of extra work, the charges consist of the

actual amount paid to each worker. No other fixed labor burdens will be considered unless approved in writing by the City.

9.7.2 Material delivered and used on the designated work, including sales tax, if paid by the Contractor or its Subcontractor.

9.7.3 Rental or equivalent rental cost of equipment, including necessary transportation, for items having a value in excess of $100. When equipment is not rented, the equivalent rental cost of equipment is based on the standard rental rates for Contractor-owned equipment, but in no event exceeds the rental rates set forth in the most current edition of the "Equipment Watch Rental Rate Blue Book", published by Penton Media. For equipment not listed in the Blue Book, the rental rate is as listed by the local section of the Associated General Contractors. If the equipment is not listed by the Associated General Contractors, the rental rate will be mutually agreed upon in writing between the Contractor and City prior to the use of the unlisted equipment. The reasonable cost of moving equipment onto and off the job site may be included, but equipment rental will not be paid when the equipment is inoperative due to breakdowns. Individual pieces of equipment or small tools having a replacement value of $100 or less are considered as included in the overhead allowances and no additional payment therefore will be made.

When equipment is used on the extra work for less than five (5) business days, hourly rates will be used. Less than thirty (30) minutes of operation are considered ½ hour of operation. When equipment is used on the extra work for more than five (5) business days, weekly rates apply. In this case, less than four (4) hours of operation is considered to be ½ calendar day of operation.

Rental or equivalent rental cost will be allowed for only those days or hours during which the equipment is in actual use. Rental and transportation allowances must not exceed the current rental rates prevailing in the locality. The rentals allowed for equipment are understood to cover all fuel, supplies, repairs, and renewals.

The City reserves the right to furnish such materials and equipment as it deems expedient, and the Contractor has no claim for profit or added fees on the cost of such materials and equipment.

9.7.4 The added fixed fees defined in Paragraph 9.5.3 constitute full compensation for the cost of general supervision, overhead, profit and any other general expense.

9.7.5 If a dispute occurs over payment for work provided on a time and material basis, the dispute is not cause for stopping work.

9.7.6 The Contractor shall maintain accurate and detailed records for all work performed on a time and materials basis. These records must reflect all the actual necessary expenses pertaining to the extra work and must at all times be available for audit by the City.

9.7.7 The Contractor shall make clear distinction in its records between the direct costs of work paid for on a time and materials basis and the costs of other work. The Contractor shall furnish the Project Manager report sheets in duplicate of each day's work that itemize the labor, materials and equipment used, and shall make the report sheets available for the City's review. The daily report sheet must provide names or identifications and classifications of workers, the hours worked, the sizes, types and identification numbers of equipment, and hours operated. Daily report sheets must be signed by the Contractor or its authorized agent and verified by the Project Manager.

9.7.8 To receive partial payments and final payment for time and materials work, the Contractor shall submit to the Project Manager, in a manner approved by the Project Manager, detailed and complete documented verification of the Contractor's and any of its Subcontractor's actual cost incurred. Material and rental charges must be substantiated by copies of vendors' invoices. Such costs must be submitted within thirty (30) calendar days after said work has been satisfactorily competed.

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1.10 GENERAL

Sections in these specifications titled "*Common Work for . . .*" shall apply to all following subsections whether directly referenced or not.

Sections in these specifications titled "*Related Sections*" shall be read as integral to the specification as if they were fully detailed within. All work and materials described in such sections shall be provided and performed by the Contractor.

1.11.00 Summary of Work

The Water Treatment Plant Standby Generator project consists of the installation of permanent standby diesel generators at the City's Water Treatment Plant and Reservoir Hill locations, installation of a diesel fuel tank at the City's Water Treatment Plant, and electrical system improvements at the City's Water Treatment Plant, Reservoir Hill, Dixonville Pump Station No. 2, Garden Valley Pump Station, Hawthorne Pump Station, Kline Pump Station, and Ventura Pump Station. Construction at the Water Treatment Plant and Reservoir Hill includes site work and construction of concrete pads. This project also includes the provision of two (2) portable generators.

1.11.02 Reuse of Documents

Contractor and any Subcontractor or Supplier shall not:

1. Have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
2. Reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
3. The prohibitions of this Paragraph will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

1.11.03 Electronic Data

1. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner to Contractor, or by Contractor to Owner, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
2. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 30 days, after which the receiving party shall be deemed to have accepted the data thus transferred.

Any errors detected within the 30-day acceptance period will be corrected by the transferring party.

3. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.
4. Computer Aided Design (CAD) files will not be made available to the Contractor. This includes AutoCAD™, Civil3D™, or other similar file types. Only printed hard copies or electronic representations of hard copies (e.g. PDF) will be provided.

1.13 Permits and Licenses

The Owner will secure and pay for the following permits:

- Building Permit
- Aboveground Fuel Tank Installation Permit

The Contractor shall acquire and pay for all other necessary permits which may include:

- Electrical Permit
- Disposal Permit

1.14 Work Restrictions

1.14.19 Use of Site

The Contractor shall not perform work activities, store materials or equipment, move equipment through, or disturb in any way the areas outside the "Utility Construction Limits" shown unless approved by the Owner in writing.

Utility construction limits may be occupied throughout the duration of the contract.

1.20 PRICE AND PAYMENT PROCEDURES

1.21.29 Quantity Allowances

If more or fewer materials are needed when the construction quantity is within plus or minus 25 percent of the bid quantity, costs for restocking of unused materials, or handling and delivery costs on additional materials shall be incidental to the bid price and no additional payment will be made.

1.21.55 Cost Increases for Materials

There will be no allowance for additional payment should the cost of any materials go up during the original contract timeframe, or during any approved contract time extensions. The Contractor is responsible for securing prices at the time of bid.

1.25.00 Substitution Procedures

Any product or construction method that does not meet these specifications will be considered a substitution. Substitutions must be approved prior to their installation or use on this project.

No guarantee is made that product model numbers included in the specifications or on the plans are current at the time of bidding. The bidder shall provide pricing in their proposal for current versions of discontinued models. If the bidder is uncertain of the correct replacement model, or feels there is a price discrepancy, the bidder shall request a substitution following the requirements of section 1.25.13.10 Substitutions Prior to Bid Opening. Requests for price increases after award will not be accepted.

1.25.13.10 Substitutions Prior to Bid Opening

Before opening bids, the Owner may consider written requests from product suppliers or prime bidders for substitutions. All requests for substitution must be received by Owner a minimum of 7 working days prior to bid opening. Requests shall be accompanied by drawings and specifications in sufficient detail to allow the Owner to determine whether or not the substitute proposed is equal to that specified. All requests shall include a listing of any significant variations in material or methods from those specified. If there are no variations, a statement to that fact shall be included in the request for approval. The determination as to whether or not a proposed substitute is acceptable shall rest solely with the Owner. Approval of substitutions will be only by addendum. The bidder shall include, in the proposal, all costs for any modifications required to adopt the substitute.

1.25.13.15 Substitutions After Contract Execution

Within 30 calendar days after the date of the contract, the Owner shall consider formal requests from the Contractor for a substitution of products in place of those specified. Submit two copies of each request for a substitution. Data shall include the necessary change in construction methods, including a detailed description of the proposed method and related drawings illustrating the methods. An itemized comparison of each proposed substitution with product or method specified shall be provided.

In making a request for a substitution, the Contractor represents that they have investigated the proposed product or method and has determined that it is equal or superior to the product specified. The Contractor shall coordinate the installation of accepted substitutions into the work, making changes that may be required for the work to be completed. The Contractor waives all claims for additional costs related to substitutions.

1.30 ADMINISTRATIVE

1.31 Project Management and Coordination

1.31.01 Contractor's Responsibility

The work included in this contract is shown on the contract plans and described in these project specifications. All work incidental and necessary to the completion of the work described and shown shall be performed by the Contractor. In submitting a bid for this project,

the Bidder warrants that they are an expert in this and related work, that they understand the process and functions shown, and that various work and processes not shown but necessary for the successful operation of this project will be provided by the Contractor.

The General (or Prime) Contractor is fully responsible for providing the subcontractors and suppliers with all relevant portions of the plans and specifications necessary to bid and construct the improvements.

Damage to existing utilities or property shall be repaired or replaced by the Contractor at the discretion of the Owner.

The Contractor and each of the Subcontractors are responsible for coordinating the required inspections. There are specific requirements for inspection responsibilities and the advance notice that must be given to minimize construction delays. It is the Contractor's responsibility to be familiar with these requirements, include the coordination necessary in this estimate of project costs and schedule, and to comply with the requirements during construction. Failure to follow proper inspection and notification procedures may result in on-site work stoppages and removal or demolition of unapproved structures or systems, all at the Contractor's expense. See Starting and Adjusting section for details.

Do not start work on this project or on any public or private right-of-way or easement until clearance is given by the Owner. It will be the responsibility of the Contractor to comply with the requirements of any permit for the project. Do not hinder private property access without a 24-hour notice to the private property owner, and do not hinder access for more than an 8-hour period. Do not disrupt emergency aid access to private property.

The Contractor is solely responsible for all elements of site safety. Inspections performed by the Owner are only to monitor and record that project plans and specifications are being complied with and construction is consistent with the design intent.

The Contractor shall be responsible for managing, coordinating, and overseeing his subcontractors, suppliers, manufacturers' representatives, or any other persons performing Work. The Contractor shall have a competent representative, familiar with the project and work being performed, on-site at all times.

1.31.10 COVID-19 Scheduling Provisions

Exclusion from Force Majeure. A force majeure event does not include the COVID-19 Pandemic. See Section 2, below, for information on how Contractor shall notify the Owner if Contractor desires to claim additional Time due to events attributable to the COVID-19 Pandemic.

Waiver. Contractor shall provide notice to the Owner of any delay attributable to the COVID-19 Pandemic in the manner specified in Section 2. Failure to provide notice to the Owner with regard to delays attributable to the COVID-19 Pandemic as required by Section 2 constitutes a waiver of Contractor's right to later make such a request.

Adjustment of Time for COVID-19.

1. Definitions.
    a. "COVID-19" means the novel coronavirus respiratory disease.

b. "COVID-19 Pandemic" means the pandemic declared by the World Health Organization on March 11, 2020.

c. "Executive Order" means any order signed by a governor restricting or prohibiting certain activities of businesses, schools, and individuals to mitigate the spread of COVID-19.

d. "Labor shortage" means a shortage of Contractor's qualified personnel because they are on leave due to COVID-19.

e. "Governmental health regulation" means any state or local health regulation aimed to mitigate the spread of COVID-19, including the social distancing regulation.

f. "Supply chain disruption" means the Contractor's inability to obtain goods used to perform the Work contemplated under the Contract due to COVID-19.

g. "Time" means any term used to define the duration the Agreement is in effect, including, but not limited to "Term" or "Contract Time."

2. Contractor's Request Required. In the event the Contractor believes that additional Time is required due to the COVID-19 Pandemic due to delays resulting from a labor shortage, a supply chain disruption, or mandated compliance with Executive Orders or governmental health regulations, the Contractor shall submit to the Owner a timely request for adjustment of Time. A request is presumed to be timely if it occurs within seven calendar days after the Contractor becomes aware of any delay caused by a reason stated in this Section. The Owner will only consider requests for adjustment of Time if the Contractor's request provides the following information:

   a. The date the delay began as a result of the COVID-19 Pandemic.

   b. The cause of the delay. The Contractor must identify in the request whether the delay is due to a labor shortage, a supply chain disruption, or compliance with an Executive Order or governmental health regulation and the specific circumstances surrounding the delay.

   c. The specific actions and efforts the Contractor is doing to limit the impact of the delay.

   d. The date Contractor expects the delay will end, if known. If not known, Contractor shall promptly notify the Owner within seven calendar days after the delay ends.

   e. The Owner shall be entitled to request from the Contractor all documentation necessary to evaluate Contractor's request for more Time under this Section.

3. Basis for Adjustment of Time. The Owner will consider causes that include delays that affect the Contractor's performance of Work directly attributable to the COVID-19 Pandemic such as an Executive Order, a governmental health regulation, a labor shortage, or a supply chain disruption that could not be mitigated by the Contractor's specific actions and efforts, or by the reasonable actions and efforts the Contractor should have taken, to minimize the delay.

4. Consideration and Response by Owner. The Owner will only consider a Contractor's request for additional Time if Contractor supplied all the required information described in Section 3(b). The Owner will review a properly submitted request for Time adjustment related to COVID-19, and within a reasonable time, will advise the Contractor of the Owner's findings. If the findings determine that Contractor is entitled to additional Time, then Owner and Contractor shall execute a written change order extending the Time equal to the length of the actual delay in performance.

Termination. In addition to the termination rights in the Agreement, the Agreement may be terminated by either party by giving notice as required in the Agreement if: 1) federal or state laws, regulations, or guidelines are modified or interpreted in a way that the Work under the Agreement is prohibited; 2) recommendations, declarations or orders by state or local governments, including local health authorities and local officials, discourage or prohibit the event or scope of work that was to be performed under the Agreement; or 3) Owner is prohibited from paying for the work from the planned funding source.

1.31.11 COVID-19 Health and Safety Plan

The Contractor shall prepare a project specific COVID-19 health and safety plan (CHSP) prior to beginning physical Work.

The Contractor shall update and resubmit the CHSP as the work progresses and new activities appear on the look ahead schedule. If the conditions change on the project, or a particular activity, the Contractor shall update and resubmit the CHSP. Work on any activity shall cease if conditions prevent full compliance with the CHSP.

The CHSP shall address the health and safety of all people associated with the project including State workers in the field, Contractor personnel, consultants, project staff, subcontractors, suppliers and anyone on the project site, staging areas, or yards. The plan shall contain the following minimum elements:

1. The CHSP shall identify all standards, guidance, publications, and sources on which it is based. Those standards may include references to OHSA, WISHA, and CDC publications that are current at the time the CHSP is prepared.
2. The CHSP shall identify a responsible individual from the Contractor who is responsible for implementation of the CHSP. The individual(s) contact information shall be listed in the CHSP.
3. The CHSP shall specifically identify the project for which it is applicable, and if applicable, shall address project work areas outside the project limits such as staging areas or yards.
4. The CHSP shall identify the PPE and administrative and engineered controls necessary to maintain a safe site. This includes but is not limited to: sanitation resources, screening stations, safety briefings, controlling access, and personal protective equipment (PPE) needed to protect workers from COVID-19.
5. The CHSP shall identify measures for screening and managing workers or visitors to areas identified in the CHSP. The plan shall include procedures should a person exhibit symptoms of COVID-19.

6. The CHSP shall identify how the plan will be updated as new work activities are added with each two week look-ahead schedule. The CHSP updates shall identify the number of workers, crews, work tasks, and the degree of congestion or confinement workers will experience for the work activities in the two week look-ahead schedule.
7. The CHSP shall include how the Contractor will ensure everyone on the site has been trained on the CHSP requirements. This includes subcontractors, suppliers, and anyone on the project site.

The Contractor shall grant full and unrestricted access to the Engineer for CHSP Inspections. The Engineer (or designee) may conduct periodic compliance inspections on the project site, staging areas, or yards to verify that any ongoing work activity is following the CHSP plan. If the Engineer becomes aware of a noncompliance incident either through a site inspection or other means, the Contractor will be notified immediately (within 1 hour). The Contractor shall immediately remedy the noncompliance incident or suspend all or part of the associated work activity. The Contractor shall satisfy the Engineer that the noncompliance incident has been corrected before the suspension will end.

1.31.19 Progress Meetings

The Contractor shall schedule and hold regular on-site progress meetings at least every two weeks and at other times as requested by the Owner or as required by progress of the work. The Contractor, Owner, and all Subcontractors active on the site must attend each meeting.

Contractor to provide an agenda covering the following items at a minimum, as applicable.

1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede planned schedule.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Discussion of upcoming required inspections/approvals.
12. Maintenance of quality and work standards.
13. Effect of proposed changes on progress schedule and coordination.
14. Safety issues relating to work.
15. Other business relating to work.

1.32.13 Scheduling of Work

Refer also to the Completion Time section under the Instructions to Bidders.

Electrical shutdowns at each of the pump stations and reservoir hill is limited to one (1) consecutive eight (8) hour period for transitioning wire to the proposed electrical equipment and energizing the proposed electrical equipment. An electrical shutdown at the water treatment plant is limited to one (1) consecutive eight (8) hour period for connecting the temporary generators. A second electrical shutdown at the water treatment plant is limited to one (1) consecutive eight (8) hour period for disconnecting the temporary generators and reconnecting circuit breakers to the switchboard bus.

The electrical system shutdowns shall not be performed until after October 15, 2021 due to the water system production needs during the summer months.

Where the plans or specifications mention notification periods in hours or days, these time periods are assumed to be working days unless specifically stated otherwise. For example, a requirement of 48-hours notification for work desired to be performed at 1:00 pm Monday requires notification be provided no later than 1:00 pm the preceding Thursday.

1.32.16 Construction Progress Schedule

Contractor is responsible for providing an up to date construction schedule with each monthly pay estimate and at other times as requested by the Owner or as required by progress of the work. If the current schedule is still in-line with the previous schedule, the Contractor shall inform the Owner with each pay estimate. Non-working day requests shall also be submitted by the Contractor with each monthly pay estimate. Owner may delay monthly progress payments if Contractor fails to submit updated schedule and non-working day requests.

1.32.29 Periodic Work Observation

The Owner may elect to have an inspector on site to monitor, observe and record construction progress. The Contractor maintains complete responsibility to verify construction is meeting the design intent and is being constructed in accordance with the plans and specifications. It is not the responsibility of the Owner's inspector to address neither means and methods issues on site nor direct safety issues on site. The Owner's inspector does not have the authority to stop work if unsafe conditions are observed.

1.33 Submittals

1.33.23 Shop Drawings, Product Data, and Samples

Submittals are required for all items installed on this contract. Submittals shall be addressed to:

RH2 Engineering, Inc.
22722 29th Dr. SE, Suite 210
Bothell, WA 98021

Attn: Chris Roberts, PE

Email: croberts@rh2.com

Submittals may be provided in electronic format (preferred) or hard copy. Owner reserves the right to require the Contractor to provide hard-copy submittals at no additional cost to the Owner. Where hard-copy submittals are provided, Contractor shall submit three (3) copies; one set will be returned to the Contractor after review.

Electronic submittal via email is acceptable, however the Contractor shall follow up with the Owner to verify that the submittal was received. The Owner assumes no responsibility for emails that do not make it to the recipient. In the case of electronic submittals, only one copy will be returned to the Contractor, either electronically or hard copy at the Owner's discretion.

Submittal data for each item shall contain sufficient information on each item to determine if it is in compliance with the contract requirements. Submittal cutsheets and datasheets shall be annotated by the Contractor and shall clearly indicate the equipment and materials that will be provided, including any options or additive items. No generic cutsheets or datasheets will be accepted.

Items that are installed in the work that have not been approved through the submittal process shall be removed and an approved product shall be furnished, all at the Contractor's expense.

Shop drawing review will be limited to general design requirements only, and shall not relieve the Contractor from responsibility for errors or omissions, or responsibility for consequences due to deviations from the contract documents. No changes may be made in any submittal after it has been reviewed except with written notice and approval from the Owner.

Shop drawings shall be submitted on 8½-inch by 11-inch, 11-inch by 17-inch, or 22-inch by 34-inch sheets and shall contain the following information:

- Project Name as it appears on the Document Cover.
- Prime Contractor and Applicable Subcontractor.
- RH2 Engineering.
- City of Roseburg.
- Applicable Specification and Drawings Reference.
- A stamp or statement that the Contractor has checked the equipment for conformance with the contract requirements, coordination with other work on the job, and dimensional suitability.
- A place for the Engineer to respond. (Engineer may elect to respond using the Engineer's standard forms.)

Submittals that do not comply with these requirements may be returned to the Contractor for re-submittal. The Contractor shall revise and resubmit as necessary. Acceptable submittals will be reviewed as promptly as possible and transmitted to the Contractor not later than 20 working days after receipt by the Engineer. Delays caused by the need for re-submittal shall not be a basis for an extension of contract time or delay damages.

Shop drawings and submittals shall contain the following information:

1. Shop or equipment drawings, dimensions, and weights.

2. Catalog information.
3. Model number, including descriptions for option and accessory codes.
4. Manufacturer's specifications.
5. Special handling instructions.
6. Maintenance requirements.
7. Wiring and control diagrams.
8. List of contract exceptions.

For integrated or package systems (see also 1.61.31), the components, shop drawings, instructions, and other elements may be submitted and reviewed individually. But the initial submittal must include the complete proposed system, and the final submittal must also be for the complete system clearly indicating all changes made during the submittal process.

By approving and submitting shop drawings and samples, the Contractor warrants that they have determined and verified all field measurements, field construction criteria, materials, catalog numbers, and similar data, and have checked and coordinated each shop drawing with the requirements of the work and of the contract documents.

The Owner will pay the costs and provide review services for a first and second review of each submittal item. Additional reviews shall be paid by Contractor by deducting up to $200 for each hour of review time from the next scheduled payment.

The Contractor is responsible for identifying the shop drawings and submittals required for this project. Specific submittal requirements are listed in each section of these specifications. Contractor shall keep a complete and up to date copy of all submittals and review responses at the job site readily available to the Owner for inspection.

1.40 QUALITY REQUIREMENTS

1.42.19 Reference Standards

Work under this contract shall be performed in accordance with applicable sections of the current Standard Specifications for Road, Bridge and Municipal Construction, Oregon State Chapter, American Public Works Association, and Oregon State Department of Transportation, hereafter referred to as the Standard Specifications.

Certain other referenced standards used in this specification are from the latest editions of:

- IBC International Building Code
- UPC Uniform Plumbing Code
- IMC International Mechanical Code
- IFC International Fire Code
- NEC National Electrical Code
- AWWA American Water Works Association

- ANSI American National Standards Institute
- ASA American Standards Association
- ASTM American Society for Testing and Materials
- OSSC Oregon Structural Specialty Code

1.43.20 Warranty

The Contractor shall warrant all work and products for a period of two (2) years following project acceptance except for those components and listed warrantees below. The date of project acceptance is defined as the date the final payment is sent to the Contractor from the Owner.

Warranty does not cover damage due to misuse by the Owner or conditions outside of the Owner or Contractor's control or exceptional events (force majeure) including war, strikes, floods (water exceeding normal high water mark), rainfall in excess of 100 year storm event, fire, earthquakes, high winds (over 85 mph for 3 seconds peak gust), freezes below 10 degrees Fahrenheit (Western Washington), freezes below minus 10 degrees Fahrenheit (Eastern Washington), governmental restrictions, vandalism, and power failures or surges. The Contractor has control over workmanship, third party subcontractors and parts and materials used to complete the project.

Warranties in addition to this warranty are listed in the following sections:

- Division 16.91.2 Engine Generator
- Division 17.05 and 17.90.1 Telemetry systems

1.45.16 Field Quality Control Procedures

Unless otherwise noted on the plans or within these specifications, 48-hour prior notice shall be given to the Owner and appropriate reviewing agency for all inspections required for the construction of the project. Forty-eight-hour notice is defined as two complete working day notice. Time is not counted on weekends and holidays (inspections required on a Monday or the day after a holiday shall be scheduled a minimum of 48 hours in advance not including the holiday hours or weekend hours.)

Contractor shall schedule and arrange for the following inspections and tests with the appropriate reviewing agency and testing company.

- Special Inspections as required per IBC Division 17 and as noted on the drawings
- Any additional inspections required by the Building Department, or other approval agency
- Soils and crushed rock compaction
- Asphalt materials and compaction

1.50 TEMPORARY FACILITIES AND CONTROLS

1.51 Temporary Utilities

The Contractor is responsible for providing all necessary water for construction-related fire protection and utilities required by this contract, or by laws and regulations. Sanitary facilities adequate for all workers shall comply with all codes and regulations.

At the close of this contract, the Contractor shall pay all utility bills that are outstanding, remove all temporary electrical, sanitary, gas, telephone and water facilities, and any other temporary service equipment that may remain. In addition, the Contractor shall arrange for the transfer of electrical and water accounts to the Owner's name.

Temporary electrical power is available at the site. The Contractor may use existing power facilities as shown on the plans.

The Contractor shall make all arrangements for the required construction power. Power is available at some locations on the construction site. The Contractor is responsible for reviewing what is available and providing what is required.

1.52.00 Construction Facilities

The Contractor is responsible for construction and location of all field offices, all necessary gates and barricades, fences, handrails, guard rails, and securities required by this contract, or by laws and regulations. There shall be shelters and dry facilities for the workers as required. The Contractor shall provide all guards, marks, shields, protective clothing, rain gear, and other equipment required by law, ordinance, labor contracts, Occupational Safety and Health Administration (OSHA) regulations, and other regulations for the maintenance of health and safety. First aid kits and equipment as required by law shall also be supplied.

1.52.20 Locks and Keys

If the Owner provides a key to the Contractor for existing Owner locks, the Contractor will be responsible for the key until returning it to the Owner. If the Contractor loses the key, the Contractor will pay for re-coring of all Owner locks that use that key.

1.54 Construction Aids

The Contractor or product manufacturer may include work, materials, or components to aid in shipping, storage, installation, or other work for their convenience. Such items shall be removed prior to final project acceptance if they may interfere with the operation or maintenance of permanent work. Some examples include, but are not limited to:

- Lifting eyes (remove only if a safety concern or obstruction)
- Picking holes (plug)
- Intermediate or shipping bracing (remove)
- Protective shipping adhesives, coatings or covers (remove and clean residue)

1.55.26 Traffic Control

Any traffic control activities required during construction shall be consistent with the Uniform Traffic Control Manual, latest edition and applicable local codes. The Contractor shall limit delay of traffic to 4 minutes.

If flaggers are used, orientation meetings per Section 00225 of the Standard Specifications shall be held each time a new flagger is introduced to the site or if site conditions change significantly. The Contractor is responsible for scheduling such meetings.

1.60 PRODUCT REQUIREMENTS

1.61 Common Product Requirements

1.61.31 Integrated (or Package) Products

Products specified as integrated or packaged must be administered with a single point of responsibility from a producer who regularly furnishes such products and is qualified to address and resolve issues during submittals, fabrication, installation, commissioning, and operation. These responsibilities will not be transferred to any other party without written approval by the Engineer. Products that fall under this category include but are not limited to the following (when specified as packaged or integrated).

- Engine Generator Sets

1.70 EXECUTION AND CLOSEOUT REQUIREMENTS

1.71 Examination and Preparation

1.71.23.16 Construction Surveying

The Contractor is responsible for surveying and staking and shall stake out the locations of the permanent easements, temporary easements, rights-of-way, and all major facilities shown on the Plans and establish bench marks at locations designated by the Owner. The Contractor shall protect all stakes and marks in their original conditions. If stakes and markings are destroyed or defaced before their use is ended, the cost of replacing them will be at the Contractor's expense. All stakes, points, and marks, shall be administered and approved by a registered professional land surveyor licensed in the State of Oregon. Provide approved and stamped survey notes, and control points to the Owner for as-built purposes.

Contractor to survey the station line(s) and install pins or offset stakes every 50 feet within areas that will not be disturbed by construction. For utility work, 5-foot and 10-foot offset stakes must be provided for major components including, but not limited to: tees, valves, manholes, catch basins, changes in angle 45-degrees or more, and vaults larger than 4-foot square.

Replace all damaged survey monuments in accordance with ORS 209.150.

1.74 Cleaning and Waste Management

1.74.13 Progress Cleaning

All areas impacted by the work shall be restored to at least original condition, unless specifically identified otherwise in the plans or specifications. All costs are incidental.

If an area of the project will be left idle, or minimal work performed for more than two weeks, the Contractor shall clean up the area prior to moving. In this context, clean-up means: stockpiles and materials shall be removed so as not to be obstructions or hazards; surfaces graded smooth as to their purpose; traffic control systems removed, and traffic restored to the satisfaction of the local road agency.

1.74.23 Final Cleaning

Clean up debris and unused material, and remove from the site and any buildings. If vehicle traffic causes ruts, repair asphalt (new or existing) in paved areas, in other areas back track with dozer or excavator and repair to proposed surface condition including necessary hydroseed, mulch, and landscaping. Eliminate weeds within the construction area prior to project closeout.

If the contract includes projects on multiple sites, and the Contractor intends to work sequentially to each site, the Contractor shall clean up the current site prior to moving onto the next. Cleanup means: stockpiles and materials shall be removed so as not to be obstructions or hazards; surfaces graded smooth as to their purpose; traffic control systems removed and traffic restored to the satisfaction of the local road agency.

Buildings shall be broom clean and all foreign damage or markings removed or repaired.

Equipment shall be washed clean using appropriate methods.

Unpainted exposed concrete structures shall be cleaned to a consistent bare concrete surface finish. Remove extraneous substances such as efflorescence, leakage residue, and excess repair materials.

Remove existing equipment or materials identified in the contract documents or that interfere with the work. Dispose of all such existing equipment or materials unless the Owner requests items to be salvaged for their use. Owner has first right of salvage.

Should the Owner identify salvageable items of their property prior to removal, the Contractor shall protect said items from damage during the work, and will be responsible for reimbursing the Owner should the Contractor damage the items.

1.75 Starting and Adjusting

1.75.16 Startup Procedures

1.75.16.10 Startup

See the Automatic Control section for control system startup.

Startup shall consist of a simulated operation of all equipment and controls. The purpose of startup shall be to check that all equipment will function under operating conditions, that all

interlocking controls and sequences are properly set, and that the facility will function as an operating unit.

Technically qualified factory representatives shall be present for the startup phase. All Representatives shall be trained, qualified, and have experience in troubleshooting and fixing field issues. The startup shall continue until it is demonstrated that all functions, controls, and machinery are functioning correctly.

Authorized manufacturer's representatives shall be provided for the following items:

- Engine Generator Sets
- Automatic Transfer Switches
- Electrical Service Switchboard
- Automatic Control Equipment

1.75.16.12 Startup and Testing Coordination

The Contractor shall conduct all testing and startup. Testing and startup shall not be a cause for claims for delay by the Contractor and all expenses for testing and startup shall be incidental to this contract.

The placing of all improvements in service shall consist of three parts: "testing", "startup", and "operation". Not less than 21 calendar days before the anticipated time for beginning testing, the Contractor shall notify and submit to the Owner for approval, a complete plan for the following:

1. Schedules for tests:
    A. Factory Demonstration Test (at panel shop and generator manufacturer's facility)
    B. Control system
    C. Emergency power system
2. Detailed schedule of procedures for startup.
3. Complete schedule of events to be accomplished during testing.
4. An outline of work remaining under the contract that will be carried out concurrently with the operation phases.

Failure to provide proper notification to the Owner may lead to liquidated damages if schedule cannot be maintained. If rescheduling is required because components are not ready for testing the notification requirements are reset and shall provide for 21 calendar days advance notice in order to reserve Engineer's and/or Owner Representatives' time.

The Contractor shall make arrangements for all materials, supplies, and labor necessary to efficiently complete the testing, startup, and operation. Measuring devices must be functional, accurate, legible, and scaled appropriately for the test. The Owner has the right to reject or require verification for any measuring device the Owner suspects in its accuracy.

At a minimum, the Contractor shall provide:

- Voltmeter

- Amp meter.
- Load Bank (generator testing)
- Sound Level (dB) measuring device (generator testing)

1.75.16.20 Testing

The Contractor may periodically request preliminary testing for items that must be covered or tested before other work can proceed. In these cases, the work shall not be tested or covered up without timely notice to the Owner of its readiness for testing. Should any work be covered up without notice, approval, or consent, it must, if required by the Owner, be uncovered for examination at the Contractor's expense. Where work is to be tested, all necessary equipment shall be set up and the work given a preliminary test so that any and all defects may be discovered and repaired prior to calling out the Owner for the test.

Final testing shall consist of individual tests and checks made on equipment intended to provide proof of performance of unit and proper operation of unit control together with necessary tests to show system operation in the presence of the Owner. Assure proper alignment, size, condition, capability, strength, proper adjustment, lubrication, pressure, hydraulic test, leakage test, and all other tests deemed necessary by the Owner to determine that all materials and equipment are of specified quality, properly situated, anchored, and in all respects, ready for use. Any certificates required by these specifications by the manufacturer's representatives shall be supplied to the Owner prior to startup.

All piping shall be tested as required by specifications and applicable codes. Tests on individual items of equipment, such as pipelines, structures, controls, and other items shall be as necessary to show proper system operation. During testing, the Contractor shall correct any defective work discovered. Startup shall not begin until all tests required by these specifications have been completed and approved by the Owner.

Not less than five working days before the anticipated time for beginning the testing, the Contractor shall provide a list of representatives that will be attending the testing. The Owner may request additional representatives at no additional cost if said representatives are identified in these specifications.

Qualified product representatives to be on site for the following equipment, at a minimum:

- Engine Generator Systems
- Electrical Service Switchboard
- Automatic Transfer Switch
- Automatic Control Equipment

Additional representatives required may be identified elsewhere in these specifications.

1.75.16.22 Scheduling of Owner Review for Testing

See Division 1.75.16.10 for scheduling and notification requirements.

In addition, the Contractor shall provide further notification two working days and two working hours (to confirm schedule) of the scheduled test to the Owner confirming that

the Contractor has successfully completed all preliminary testing and that all equipment, tools, materials, labor, subcontractors, manufacturer's representatives, and all other items required for witnessed testing are available and fully functional. Failure to provide advance notification and confirmation, or meet any of the testing requirements shall constitute a failed test in accordance with the section Inspection and Tests of the General Conditions.

A detailed testing schedule shall be provided by the Contractor and updated as needed to be at least 48 hours ahead of actual testing at the project site. If testing requires downtime in order to perform repairs due to failed test, the Contractor shall pay the Owner in the amount of $200 per hour per Owner Representative on site (minimum of $400 per scheduled visit) for downtime lasting longer than 1 hour required to complete repairs to verify the complete construction is ready for startup and operation. This amount will be deducted from the appropriate bid item that relates to the finished construction and documented by the Owner at their discretion. The Contractor is required to have all systems pre-tested to their satisfaction prior to calling the Owner for formal testing.

Schedule shall include system testing starting on Mondays or Tuesdays so that the remainder of the week can be used to identify the stability of the electrical and control system for the SCADA system, pump station, or treatment plant. Testing shall not start on a Thursday, Friday or the day before an Owner identified holiday.

1.75.16.40 Electrical and Control Systems Testing

See also the applicable electrical sections for electrical system testing.

See also the applicable automation sections for automatic control system testing.

The following is a list of components that shall be tested prior to project completion. This list is intended as a general guide and is not necessarily complete:

- Engine Generator Systems
- Automatic Transfer Switches
- Electrical Equipment
- Local control
- Automatic control

1.78 Closeout Submittals

1.78.23 Operation and Maintenance Data

Failure to provide acceptable final documentation including O&M manuals and as-built drawings will result in non-payment of the appropriate bid item in the schedule of prices.

See also the Automatic Controls section for additional requirements for automatic control systems manuals. Detailed requirements for specific equipment and systems may also be included in their respective specification sections.

The Contractor shall remove and preserve all tags and instructions that come packaged with or attached to equipment used on the project. Deliver all such documents to the Owner bound in a three-ring binder or with the Operation and Maintenance Manual. Insert documents in

sleeves if they cannot be punched. Scan all such documents to Adobe PDF format and provide with the Operation and Maintenance (O&M) Manual.

Prior to the receipt of payment for more than 90 percent of the work, the Contractor shall deliver to the Owner acceptable manufacturer's operating and maintenance instructions covering equipment and systems installed on the Project requiring operational and/or maintenance procedures and for any additional items indicated by the Owner, including coatings furnished under this contract.

The operating and maintenance instructions shall include, as a minimum, the following data for each coating and item of mechanical and electrical equipment:

Products

A. Equipment Identification including brand name, model number and serial numbers.

B. Date of manufacture and date of installation on job site.

C. Complete as-built elementary wiring and one-line diagrams.

D. Complete parts list, by generic title and identification number, complete with exploded views of each assembly.

Maintenance

A. Recommended spare parts.

B. Lubrication schedule including the applicable lubricant designation available from the Standard Oil Company of California.

C. Recommended preventive maintenance procedures and schedules. Schedule shall be provided for daily, weekly, monthly, quarterly, semi-annually and annually maintenance.

D. Disassembly and re-assembly instructions including parts identification and a complete parts breakdown for all equipment.

E. Weights of individual components of each item of equipment weighing over 50 pounds.

F. Name, location, and telephone number of the nearest suppliers and spare parts warehouses.

G. All manufacturers' warranties. Include name, address, and telephone number of the manufacturer's representative to be contacted for warranty, parts, or service information.

H. Cleaning, repair, and maintenance instructions for each coating system.

I. Provide USB flash drive or DVDs utilized in the manufacturer's instruction program for the owner.

Operation

A. Recommended trouble-shooting and startup procedures.

B. Recommended step-by-step operating procedures.

C. Emergency operation modes, if applicable.

D. Normal shutdown procedures.

E. Long term shutdown (mothballing) procedures.

F. Equipment specifications and guaranteed performance data.

G. General manuals which describe several items not in the contract will not be accepted unless all references to irrelevant equipment are neatly eradicated or blocked out.

Provide 3 hard copies of O&M manuals and 3 electronic copies on flash drives.

Each set of instructions shall be bound into multiple volumes; each volume to be complete with an index and bound in a suitable, hard-covered binder. Binders shall be of hardback construction with full-length metal hinge. Capacity shall be 3-inch to 5-inch as appropriate for the quantity of O&M documentation. More than one binder may be required for large projects. Binders shall be equal to Wilson-Jones WLJ344 series or WLJ369 series or Specialty Loose Leaf models 87784, 98085, 98086, or 98984.

Manuals shall be assembled and indexed so that information on each coating and piece of equipment can be readily found.

Progress payments for the total contract work in excess of 90 percent completion may not be made until the operation and maintenance manual has been delivered and approved by the Owner, at their discretion.

The Contractor shall secure and deliver to the Owner all equipment warranties and other warranties and guarantees required for all equipment and processes. Delivery shall be done at one time covering all major and minor equipment warranties. Copies of the warranties shall be included in each O&M Manual.

See Division 1.43.20 for details regarding required warranties for specific components.

1.78.39 Project Record Documents

Prior to receiving final payment for the work, the Contractor shall deliver a complete set of acceptable "As-Constructed" records to the Engineer. Plans shall be made on clean, unmarked prints for this project in accordance with the following standards:

- Yellow markings or highlights = deleted items
- Red markings = new or modified items

The Contractor shall provide "as-built" information on all items and work shown on the plans showing details of the finished product including dimensions, locations, outlines, changes, manufacturers, etc. The information must be in sufficient detail to allow the Owner's personnel to locate, maintain, and operate the finished product and its various components.

The Contractor shall submit copies of preliminary as-built records documenting the previous month's work with each pay request. Preliminary records shall consist of photocopies/scans of field notes and redlined drawings and shall contain sufficient detail as to accurately locate the horizontal and vertical location of all permanent improvements based on an established and consistent control point(s). Failure to provide complete and accurate preliminary as-built information will constitute grounds for withholding progress payments.

See also electrical plan requirements in Division 16.05.

1.79 Demonstration and Training

1.79.10 Training

See the Automatic Control section for automatic control systems training.

At the time that the facility is ready to be put into operation, the Contractor is to conduct an operation and maintenance training meeting with the owner to explain in detail the operation and maintenance requirements of each of the facility's components. The training meeting shall not occur on the same date(s) as a startup.

Operation of the facility shall commence immediately after completion of testing, startup, and owner training and after satisfactory repairs and adjustments have been made.

1.80 PERFORMANCE REQUIREMENTS

1.81 Facility Performance Requirements

1.81.30 Seismic Restraint and Anchorage

Contractor shall furnish seismic restraint for all architectural components, equipment, tanks, machinery, piping, valves, conduit, and other mechanical and electrical components. Seismic restraint shall be designed to meet IBC (ASCE 7 Chapter 13 – "Seismic Design Requirements for Nonstructural Components") code requirements. The following design values shall be used in calculating seismic forces:

Ip = 1.5	Sds = 0.646 g	Seismic Design Category = D

A complete seismic restraint system shall be provided including struts, straps, bolts, nuts, washers, etc. as required for secure attachment to foundations, pads, ceilings, floors, and/or walls.

Contractor shall submit either of the following in accordance with ASCE 7, 13.2.1 for all components:

1. Project-specific design and documentation prepared and submitted by a registered design professional.
2. Submittal of the manufacturer's certification that the component is seismically qualified by
    a. Analysis
    b. Testing in accordance with the alternative set forth in ASCE 7, Section 13.2.5.
    c. Experience data in accordance with the alternative set forth in ASCE 7, Section 13.2.6.

Special Certifications are required for the following systems for Seismic Design Categories C, D, E, and F. Systems shall be certified in accordance with ASCE 7, 13.2.2.

1. Mechanical and electrical equipment that must remain operable following the design earthquake. All mechanical and electrical equipment installed under this project falls under this category.

2. Components with hazardous contents.

All materials and fabrication shall be as required in these specifications. Contractor shall submit this information to the Owner for review prior to fabrication and installation.

Contractor shall install seismic restraints when called for in the contract or recommended by the product manufacturer. Install in accordance with the manufacturer's requirements as applicable.

Seismic restraint systems shall be installed so as not to interfere with normal operations and maintenance of the equipment and other components as shown on the plans. Interference with normal operations and maintenance shall be as determined by the Owner. Drilled-in anchors for non-rotating equipment shall be Concrete Anchors unless otherwise specified.

1.81.45 Location Designations

The following location designations shall be used except where otherwise noted on the plans:

Dry Locations: Indoor continually dry areas including office, laboratory, blower, and electrical rooms.

Wet Locations: All locations exposed to the weather, whether under a roof or not, or within channels, basins or tanks.

Damp Locations: Process areas; areas containing pumps, valves, and major piping; all spaces wholly or partially underground, or having a wall or ceiling forming part of a channel or tank, unless otherwise designated on the Plans. Any areas which do not fall within the definitions for dry, wet, or corrosive shall be considered damp.

Corrosive Locations: Areas where chlorine gas under pressure, sulfuric acid, or liquid polymer are stored or processed, sewer wetwells and sewer manholes.

Immersed or **Submerged Locations:** Areas which are periodically, or continuously submerged in, or contain a liquid.

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2.00 GENERAL

Sections in these specifications titled "*Common Work for . . .*" shall apply to all following subsections whether directly referenced or not.

2.05 Common Work for Exterior Improvements

This division covers that work necessary for providing materials and performing all sitework as described in these specifications and as shown on the Plans.

Part 1 - General

Submittals

Submittal information shall be provided to the Owner for the following items:

- General Fill
- Structural Fill
- Pipe Bedding
- Trench Backfill
- Gravel Backfill for Drains
- Crushed Surfacing
- Paving
- Fencing

Other Items listed in this section or required by the Owner.

2.08 Special Inspections for Earth Work

Part 3 – Execution

Field Quality Control

Special inspections including visual, probing of subgrade and compaction effort (nuclear densometer) are required for the following locations:

- Generator and Fuel Tank pad and Electrical and Switchboard pad, including native subgrade and crushed surfacing base. (Visual, probe. Nuclear densometer testing if found necessary by the Owner)
- Parking area fill and native subgrade (visual, probe. Nuclear densometer testing if found necessary by the Owner)

Areas where fill (either native or non-native) is being placed shall be tested for compaction compliance by a special inspector. The special inspector and all testing shall be provided and paid for by the contractor. If tests indicate failure of compaction requirements, the Contractor shall pay for subsequent tests until tests indicate compliance with the specifications. Areas of

native undisturbed subgrade shall be visually inspected by the Owner prior to placement of any material overtop. Contractor shall coordinate with the Owner a minimum of two (2) full working days prior to inspection being needed.

The Contractor shall fully cooperate with the special inspector, including providing safe access to the testing areas. No extra compensation will be provided for cooperation with and facilitation of inspections.

2.10 SITE PREPARATION

2.10.2 Clearing and Grubbing

Part 3 - Execution

Construction

Clearing and grubbing shall be performed by the Contractor to remove and dispose of unwanted debris, vegetative matter, and other items noted on the Plans within the construction limits and shall conform to Section 00320 of the Standard Specifications.

Protect trees and tree roots, structures and foundations, utilities, fences, and all other improvements not to be removed regardless if shown to be protected on the Plans.

Remove and relocate permanent improvements that are within the construction limits, such as mailboxes and traffic signs. Locate mailboxes such that mail service is maintained during construction. Return facilities to original location, or plan location, at completion of local work.

Do not remove organic material including plants, grasses, trees and native topsoil unless directed by the Plans. In instances where the Contractor is allowed to clear areas to facilitate construction but is not required to, any areas disturbed by construction shall be surface restored to existing or better condition including matching surface restoration with hydroseed or plantings as shown in adjacent areas required to be modified by the Plans. Where the Contractor is allowed to clear areas to facilitate construction, surface restoration shall be completed at no additional cost to the owner.

2.11 Earthwork Materials

2.11.1 Common Work for Earthwork Materials

Part 1 - General

Acceptance at Site

Owner shall review the site near the end of each pay period to determine the equivalent percentage of earthwork completed compared to the total earthwork lump sum price. Contractor shall be paid based on the percentage completed based on Owner's judgment of percent complete.

Part 2 - Products

Source Quality Control

All imported fill material shall be free of hydrocarbons (e.g. gasoline, diesel, oil, etc.), pesticides, herbicides and other hazardous volatile organic compounds (VOCs) and synthetic organic chemicals (SOCs). The Contractor shall provide certification to the owner that the fill is free of these chemicals.

2.11.2 General Fill

Part 1 – General

Summary

All fill required for this project that is not specifically defined as another type shall be "General Fill".

References

Section 00405.14 of the Standard Specifications, Class A Backfill.

Part 2 – Products

Components

General fill shall be soil free of organics, debris, and other deleterious materials with no individual particles having a maximum dimension larger than 5 inches. The moisture content of the material and weather conditions at the time of placement will be used to determine the suitability of native materials for backfill as general fill.

Part 3 – Execution

Installation/Construction

All general fill shall be compacted in uniform layers not exceeding 12 inches in loose thickness and compacted to at least 90 percent maximum dry density based on the ASTM D-698 (standard) test procedure.

2.11.3 Structural Fill

Part 1 – General

Summary

All fill placed below, beside and against building components, building structures, vaults, manholes, handholes, slabs, sidewalks, and drives shall be "Structural Fill" unless other fill materials are specifically shown on the Plans. The structural fill material has been selected to support the weight of the structure in combination with the existing native material and to prevent adverse movement during an earthquake. The Contractor must take particular care to maintain the integrity of the design by using structural fill where shown.

References

Where free draining material for use as structural fill is required as indicated on the plans, it shall conform with Section 02630.10, Dense-Graded Aggregate, 2½-inch – 0 of the Standard Specifications. Amount passing the No. 200 sieve shall be 5 percent or less. Fracture of rounded rock does not apply.

Structural fill for foundation subgrades or where free drainage is not required through the structural fill shall conform with 02630.10, Dense-Graded Aggregate, 2½-inch – 0 of the Standard Specifications. Amount passing the No. 200 sieve shall be between 15 percent and 25 percent. Fracture of rounded rock does not apply.

Part 2 – Products

Components

Structural fill shall be soil free of organics, debris, and other deleterious materials. The Owner shall determine if native on-site materials are suitable for use as structural fill.

Part 3 – Execution

Installation/Construction

The moisture content of the material and weather conditions at the time of placement will be used to determine the suitability of native materials for backfill as structural fill. Structural fill shall bear on firm base and be placed in uniform layers not exceeding 8 inches in loose thickness. The backfill area must be free of standing water and the subgrade soils must be stable. Each layer of structural fill shall be compacted to at least 95 percent of its maximum dry density based on the ASTM D-1557 (modified).

2.11.4 Pipe Bedding

Part 1 – General

Summary

All fill placed below and around buried utilities shall be "Gravel Backfill for Pipe Bedding". The pipe bedding material has been selected to support the weight of the utility by distributing the load so that the completed utility and backfill system does not weigh more than the native material. In addition, the grain size has been selected so that the bedding will not migrate into the bottom of the trench. The Contractor must take particular care to maintain the integrity of the utility design by using the appropriate pipe bedding material where shown.

References

For Ductile Iron, Steel, or Concrete Pipe larger than 4-inch diameter: Bedding material shall conform with Section 00405.12 Bedding of the Standard Specifications and be open graded aggregate conforming with Section 02630.11

For PVC, HDPE, CPEP sewer, storm and water piping regardless of diameter and all other piping and conduit 4-inch in diameter or less conform with Section 00405.12 sand bedding of the Standard Specifications or as approved by the Inspector.

Pipe bedding used around restrained joint pipe must be a well graded cohesive material with fines. Rounded gravels and pea gravel are not acceptable.

Part 3 – Execution

Installation/Construction

Bedding material shall surround the pipe and conduits to the limits shown on the Plans and provide uniform support along the entire length without allowing concentrated loading at joints or bells or that results in any bridging of the pipe. All bedding material shall bear on firm subgrade and be compacted to firm and unyielding condition.

2.11.5 Trench Backfill

Part 1 – General

Summary

All fill placed above the pipe bedding in a trench shall be "Trench Backfill". The trench backfill material has been selected to distribute surface loads over the utility. In addition, the grain size has been selected so that the trench backfill will not migrate into the pipe bedding or trench walls. The Contractor must take particular care to maintain the integrity of the utility design by using the appropriate trench backfill material where shown.

References

Trench backfill shall consist of materials conforming to Section 00405.14 Trench Backfill of the Standard Specifications and be Dense Graded conforming with Section 02630.10, or as approved by the Owner.

Part 3 – Execution

Installation/Construction

Trench backfill shall follow the requirements of Section 00405.40 of the Standard Specifications.

2.11.6 Rock Backfill for Drains

Part 1 – General

Summary

All fill placed around drain pipes in a trench shall be "Rock Backfill for Drains". Rock backfill for drains shall provide drainage for stormwater runoff and infiltration galleries.

References

Rock backfill for drains shall be clean washed, 4-inch minus round river cobbles with less than 5 percent passing the ¾-inch screen or similar as approved.

2.11.7 Gravel Base Course

Part 1 – General

Summary

All fill placed under paving, foundations or structures and next to native material shall be "Gravel Base Course" unless otherwise called out on the Plans.

References

Aggregate for gravel base course under structures, and foundations shall conform Section 02630.10, Dense –Graded 1½-inch - 0 of the Standard Specifications.

2.11.8 Gravel Top Course

Part 1 – General

Summary

Gravel surface paving as shown on the Plans shall be "Gravel Top Course".

References

Aggregate for gravel top course shall conform Section 02630.10, Dense – Graded 1-inch – 0 or ¾-inch – 0 of the Standard Specifications.

2.11.20 Geotextile Fabric

Part 1 – General

Delivery, Storage, and Handling

All fabrics shall be shipped, stored, placed, overlapped and secured based on manufacturer requirements.

Part 2 – Products

Materials

Geotextile Fabric shall be chosen by the Contractor to meet the requirements based on place of use.

For geotextile fabric placed below crushed rock in road subgrade it shall be equal to

Tencate Mirafi 500X

2.12 Road Surfacing

2.12.3 Hot Mix Asphalt (HMA) / Asphalt Concrete Pavement (ACP)

Part 1 – General

Definitions

The Plans and specifications may call out Hot Mix Asphalt (HMA) or Asphalt Concrete Pavement (ACP). The terms are synonymous.

References

References

Hot Mix Asphalt (HMA) shall comply with Section 00744 of the Standard Specifications. All HMA shown on the Plans shall be Commercial HMA unless otherwise noted. Furnish, place, spread, and compact HMA to the thickness shown on the Plans.

HMA used for road paving and patching shall comply with Section 00744 of the Standard Specifications for HMA Class ½-inch. HMA used for driveways and parking lots shall be HMA Class ⅜-inch. Furnish, place, spread, and compact ACP to the thickness shown on the Plans.

2.20 EARTH MOVING

2.23 Excavation

Part 1 – General

Summary

The Contractor shall excavate as necessary to construct the improvements shown.

Part 2 – Products

Materials

All excavated material shall be removed from the project site.

Part 3 – Execution

Installation/Construction

Excavation shall include the digging, scraping, and removing existing native material, abandoned or interfering utilities, abandoned or interfering structures and any other obstacles necessary for the construction of the improvements shown on the Plans. Excavation includes utility excavation, structural excavation, and grading excavation.

Utility excavation shall be performed to the depths necessary to complete the utility construction work shown.

Structural excavation shall be performed to the limits shown and established by the Owner. The base of the excavation shall extend laterally a minimum of 2 feet beyond the structure unless specified otherwise on Plans.

Excavated material may be stockpiled on site with prior approval from the Owner.

Examination

The base of the excavation shall be evaluated by the Owner to determine if it is suitable for backfilling. The Owner will evaluate the stability of the base of excavation by determining if all significant organic soils or other unsuitable materials have been removed.

Construction

Excavation required by the Owner that is beyond the depth shown shall be performed by the Contractor per the direction of the Owner. The Contractor will be reimbursed for additional excavation as specified in Division 18, "Measurement and Payment".

2.25.3 Temporary Erosion and Sedimentation Control

Part 1 – General

Quality Assurance

The Contractor shall provide TESC facilities or processes as necessary to ensure that erosion and sedimentation problems do not occur. The Contractor shall inspect the TESC facilities daily and maintain the systems as necessary to prevent off-site damage.

Part 2 – Products

Materials

Straw or mulch shall be applied to any exposed surfaces to minimize erosion and filter surface water runoff. Where straw or mulch is required for erosion control, it shall be applied to a minimum thickness of 2-inches. Straw shall not include Reed Canary grass.

Part 3 – Execution

Installation/Construction

All erosion/sedimentation control systems including; fencing, earth berms, grasses, straw, mulch, culverts, drain pipe, outfalls and other items required by for this project, must be installed prior to any clearing, grubbing, excavation, or grading work or other work that could result in off-site stormwater or material flows. Erosion/sedimentation controls systems must remain in place throughout the duration of the construction activities. The systems may be relocated to complete utility, excavation, grading, and landscaping activities if their location impedes the associated work. If the systems are relocated to complete any work they must be reinstalled to protect the construction and surrounding areas prior to commencing work on other portions of the project.

The Contractor shall take care and diligence to minimize erosion exposure and provide erosion and sedimentation control measures as shown on the Plans and required by construction practice.

Stabilized construction entrances and wash pads shall be installed at the beginning of construction activities and shall be maintained for the duration of the project. Wash pads shall be kept clean to prevent the transport of sediment onto adjoining roads.

Earth berms shall be installed as necessary to prevent the migration of surface water into excavations or off of the project site. Surface water that is intercepted by earth berms shall be routed to an approved stormwater conveyance system. The Contractor shall ensure that the concentration of surface water at the earth berm does not erode the adjoining or downstream properties. Sediment deposited against the earth berm shall be removed to ensure that surface water can flow freely. The earth berm shall not be removed before the stabilization of the surface downhill from the berm.

2.30 SITE IMPROVEMENTS

2.31 Fencing and Gates

2.31.1 Common Work for Fencing

Part 1 – General

Related Sections

- Division 3 Concrete

Part 3 – Execution

Preparation

Clear the area along the fence path, remove surface irregularities and grade earth smooth and continuous prior to fence installation.

2.31.3 Chainlink Fence

Part 1- General

Summary

This section describes the requirements for the chainlink fence located as shown and detailed on the Plans and these specifications.

Related Sections

- Division 2.31.1 Common Work for Fences
- Division 3.31.3 Post Footings

References

Chainlink Fence Manufacturers Institute Product Manual Specifications

ASTM F626, A392, A817, F668, F1043, F1083, A121, F567

Submittals

Galvanizing information, steel quality standards, hardware quality standards.

Dimensional drawings including details, finishes, accessories and foundations.

Part 2 - Products

Materials

Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.

Chain-Link (woven wire fabric) fencing shall be commercial grade, as detailed on the Plans and in accordance with Section 03010.30 of the Standard Specifications except as modified herein.

Components

Fence Fabric: Galvanized wire: ASTM A392 - 1.2 oz./sf. Wire Spec-A817, Type and class per use and location of the project.

Size: Helically wound and woven to height of as indicated on drawings with 2-inch diamond mesh and core wire gauge of 9.

Selvage of fabric: twisted and barbed at top and twisted at bottom unless noted otherwise on the Plans.

Steel Fence Framework: Steel pipe - Type I: ASTM F1083, standard weight schedule 40 (ASTM F1043 Group IA); minimum yield strength of 30,000. Outside diameter (OD) sizes as shown on the Plans. Hot-dipped galvanized with minimum average 1.8 oz./ft² of coated surface area.

Accessories

Chain link fence accessories per ASTM F626 Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing.

Post caps: Formed steel weather tight closure cap for pipe posts. Provide one cap for each post. Cap to have provision for barbed wire when necessary.

Wire ties: 9-gauge galvanized steel wire for attachment of fabric to line posts. Thirteen gauge for rails and braces.

Brace and tension (stretcher bar) bands: Pressed steel, minimum 300-degree profile curvature for secure fence post attachment.

Tension (stretcher) bars: One piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of $^{3}/_{16}$ inch by ¾-inch. Provide tension (stretcher) bars where chain link fabric meets terminal posts.

Tension wire (used when top rails are not required): Polymer Steel Tension Wire ASTM F1664 class 2B, fused and adhered, 6 gauge, with tensile strength of 75,000 psi. Hog ties are permissible.

Tie rod, truss rods, and tightener: Steel rods with minimum diameter of ⅜-inch. Capable of withstanding a tension of minimum 2,000 lbs.

Barbed wire: ASTM A121 Class 3, zinc coated steel wire double-strand, 14 gauge twisted line wire with galvanized steel, 4 point barbs spaced approximately 5 inches on center.

Barbed wire supporting arms: Pressed steel arms with provisions for attaching three rows of barbed wire. Arms shall withstand 250 lb. downward pull at the outermost end of arm without failure. Provide three strands single arm

Nuts and bolts are galvanized.

Fabrication

Fence frames that require welding shall be hot dipped galvanized in the shop unless approved otherwise by the owner.

Part 3 - Execution

Installers

Installers shall have a minimum of two years of experience. References from three previous projects shall be submitted for review during shop drawing submittal.

Examination

Verify areas to receive fencing are completed to final grades and elevations.

Ensure property lines and legal boundaries of work are clearly established.

Perform complete utility locates within the areas of fencing to verify conflicting utilities. Fence posts may require adjustment to avoid utilities by a minimum of 2-feet.

Installation/Construction

Chainlink Fence Framing Installation:

A. Install chain link fence in accordance with ASTM F567 and manufacturer's instructions.

B. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30 degrees or more.

C. Space line posts uniformly at 10-feet on center maximum and to avoid utilities by 2-feet minimum.

D. Concrete set terminal and gate posts: Drill holes in firm, undisturbed or compacted soil. Trowel finish around post. Slope to direct water away from posts. Footings shall be sized per schedule on the Plans.

E. Check each post for vertical and top alignment and maintain in position during placement and finishing operations.

F. Bracing: Install horizontal pipe brace at mid-height for fences 8-feet tall and over, on each side of terminal posts. Firmly attach with fittings. Install diagonal truss rods at these points. Adjust truss rod, ensuring posts remain plumb.

G. Tension wire: If shown on the Plans, install tension wire before stretching fabric and attach to each post with ties. Secure tension wire to fabric with 12½ gauge hog rings 24 inches O.C.

Chain Link Fabric Installation

A. Fabric: Install fabric on side facing outward from site and attach so that fabric remains in tension after pulling force is released. Leave no more than 3-inches between finish grade

and bottom selvage. Attach fabric with wire ties to line posts and tension wire at 15-inches on center and to rails and horizontal braces at 24-inches on center.

B. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips spaced maximum of 15-inches on center. Hog ties are allowed.

Accessories

A. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.

B. Fasteners: Install nuts on side of fence opposite fabric side for added security.

C. Barbed wire: Uniformly space parallel rows of barbed wire on security side of fence. Pull wire taut and attach with clips or in slots of each extension.

2.60 CONTAMINATED & WASTE MATERIALS HANDLING

2.60.2 Waste Material Control

Part 1 – General

Quality Assurance

Adhere to all requirements of federal, state, and local statutes and regulations dealing with pollution. Permit no public nuisances.

Use only dump sites that are approved by the regulatory agency having jurisdiction, and present proof of approval upon request.

Part 3 – Execution

Installation/Construction

The Contractor shall take precautions to warn, protect, and prevent the public from all hazards that exist on site due to any demolition or construction operations. Stockpiled debris shall be surrounded with yellow warning tape attached to lath, stakes, poles, or fencing to warn the public of any potential hazard.

Use water sprinkling, temporary enclosures, or other methods to limit dust and dirt from rising and scattering in the air. Surface water runoff that is contaminated with site debris, silt, or other material that adversely affects water quality shall be collected and cleaned prior to discharge. On site collection ponds may not be used to keep silt laden water from entering the storm water collection system.

Do not use water to control dust when its use may create hazardous or objectionable conditions such as ice formation, flooding, and pollution.

The Contractor shall minimize the amount of dust and other airborne particles caused by any demolition, excavation, stockpiling, or removal activities. Dust control measures shall be implemented by the Contractor prior to the beginning of work activities. Exposed soil may be wetted with water or covered to minimize dust creation. Water runoff from the wetting procedure shall be accumulated and cleaned prior to disposal. Water runoff accumulation shall be removed from the site prior to project completion.

Cleaning

At all times, keep the construction area clean and orderly and upon completion of the work, leave buildings broom clean and all parts of the work clean and free of rubbish and excess material of any kind. Leave fixtures, equipment, walls, and floors clean and free of stains, paint or roofing splashes, or other marks or defects. Upon completion, restore site of all work or equipment and material storage areas to their original conditions. Remove all miscellaneous unused material resulting from work and dispose of it in a manner satisfactory to the Owner. The site, through the progress of construction, shall be kept as clean as possible and in a neat condition.

2.61 Contaminated Materials

2.61.2 Toxic Spill or Release Contact Requirements

Part 3 - Execution

Field Quality Control

During construction, if there is any toxic substance spill or release discharged into the environment, report the location, quantity, date and time of the spill or release to Oregon Office of Emergency Management at 1 (800) 452-0311 and the Owner's representative. Spills shall be monitored, contained, and cleaned up to applicable codes at the Contractor's expense.

During construction, spills shall be reported if spill includes:

- Any amount of oil to waters of the state
- Oil spills on land in excess of 42 gallons
- Hazardous materials that are equal to, or greater than, the quantity listed in the Code of Federal Regulations, 40 CFR Part 302 (List of Hazardous Substances and Reportable Quantities), and amendments adopted before July 1, 2002.

Report spills to:

- The Oregon Emergency Response System: 1-800-452-0311
- The National Response Center: 1-800-424-8802

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3.00 GENERAL

Sections in these specifications titled "*Common Work for . . .*" shall apply to all following subsections whether directly referenced or not.

3.05 Common Work for Concrete

Part 1 - General

This division covers that work necessary for furnishing and installing all concrete as described in these specifications and as shown on the Plans.

References

Materials shall conform to the following standards:

- Cement - ASTM C-150
- Coarse aggregate - ASTM C-33
- Fine aggregate - ASTM C-33
- Admixtures - ASTM C-494
- Air-entraining admixtures – ASTM C-260
- Fly Ash – ASTM C-618
- Admixture and products in contact with potable water – NSF 61

Submittals

Submittal information shall be provided to the Owner for the following items:

- Concrete mix design including aggregate gradation and substantiating strength data.
- Admixture Data
- Special placement procedures for hot or cold weather
- Construction Joint Plan
- Concrete anchors
- Concrete anchor installer certification per ACI/CRSI Adhesive Anchor Installer Certification Program.
- Rebar mill certifications
- Rebar placement shop drawings

Concrete mix designs shall be submitted to the engineer for approval a minimum of two weeks prior to placing any concrete. The mix design shall include the amounts of cement, fine and coarse aggregate, water and admixtures, as well as the water cement ratio, slump, concrete yield, aggregate gradation, and substantiating strength data in accordance with ACI 318, Chapter 5. A batch plant inspection may be required, the cost of which shall be paid by the Contractor. Review of mix submittals by the engineer of record indicates only that

information presented conforms generally with contract documents. Contractor or supplier maintains full responsibility for specified performance.

Part 2 - Products

Components

Nominal maximum size for aggregates is the smallest standard sieve opening through which the entire amount of aggregate is permitted to pass. Provide intermediate aggregate grades as required to achieve a well-graded mix.

All concrete surfaces exposed to weather or standing water shall be air entrained. Total air content shall be in accordance with IBC requirements unless specified otherwise herein. Air shall be measured at the truck, unless otherwise agreed to.

Water used in concrete shall be potable.

Fly ash may be substituted for up to 15 percent of the required cement, except where noted.

Mixes

Concrete shall be mixed, conveyed, and proportioned in accordance with IBC section 1905.

The concrete mix shall include the amount of cement, fine and coarse aggregate, including aggregate gradations, water, and admixtures as well as water cement ratio, slump, concrete yield, and sustaining strength data in accordance with these specifications, the requirements of the International Building Code Section 1905, and the requirements of ACI 318.

Part 3 - Execution

Inspection

See Statement of Special Inspections on the Drawings for special inspection requirements. Provide two (2) full working day notice to Owner prior to needing the required inspections.

Also comply with local building department and permit requirements for inspection and notification.

The Contractor shall repair, replace or modify, as appropriate, any items noted in the Special Inspector's inspection or the building department inspection.

Testing

Concrete strength tests shall be performed per section 1905.6 of the IBC and per the requirements noted herein. The Contractor will provide and pay all costs of concrete testing. The Engineer shall be furnished with copies of all inspection reports and test results.

Cylinders used for concrete strength tests shall be 6 by 12. Four by 8 cylinders may be used for mixes with maximum aggregates less than 1-inch, however the testing lab must apply a 0.94 multiplier to the compressive strength test results unless data acceptable to the Engineer is presented that would justify a higher multiplier. All mixes utilizing aggregates over 1 inch shall be tested using 6 by 12 cylinders.

When 4 by 8 cylinders are utilized AASHTO T23 requirements shall be followed, and the retainer used with neoprene pads when testing for compressive strength shall be constructed according to ASTM C 1231.

The Contractor will coordinate all concrete testing with the testing agency. Costs will be paid by the Contractor.

Give the Owner and testing agency 48-hour notice prior to concrete placement. If Contractor fails to provide the required notice, the Owner may elect to cancel the affected concrete placement. Contractor shall be responsible for costs and delays due to improper notification.

If the Contractor schedules a concrete placement and does not notify the Owner and testing agency of a cancellation within 24 hours of the scheduled placement, the Contractor shall pay the testing agency costs for an unnecessary trip. If the Contractor fails to provide the testing agency with adequate notification and testing agency cannot attend concrete placement, Contractor shall reschedule placement. Contractor shall be responsible for all associated delays.

The Contractor shall provide all assistance and cooperation necessary to testing personnel to obtain the required concrete tests. Contractor and Owner will have access to testing results as soon as they are available.

The testing agency shall take a minimum of four samples for every 50 yards of concrete placed (and a minimum of four per pour); one for a 7-day test, two for 28-day tests, and one for backup testing in case the other two samples do not meet design strength. Additional samples may be taken to verify strength prior to form removal at the Contractor's expense.

3.06 Maintenance of Concrete

3.06.30.71 Resurfacing of Cast-in-Place Concrete

Part 1 - General

This division covers that work necessary for repairing spalled and damaged concrete. Repair any areas with deterioration exceeding ½-inch, where rebar is exposed or where directed by the Owner.

Part 2 - Products

Materials

CONCRETE REPAIR MATERIAL: SikaTop 111 PLUS or equal cement-based repair mortar. Mortar shall be ANSI/NSF Standard 61 approved if in contact with potable water and contain a corrosion inhibitor. See Manufacturer's Literature for primer and auxiliary products appropriate for use with the repair material.

SILANE SEALER shall be alcohol based, 95 percent silane. No fillers, sterates or paraffins are allowed. Use DUR A PELL 100 as manufactured by Chemprobe Coating Systems or equal.

Part 3 - Execution

Preparation

The Contractor shall be familiar with the product and methods and be prepared to discuss the repair procedure at the Preconstruction Meeting.

High pressure power-wash the exposed structure to remove all loose, delaminated concrete to sound concrete.

Surface Preparation: Remove loose, delaminated concrete to sound concrete. Where corrosion of the reinforcement exists, continue bulk removal along the reinforcing steel and adjacent areas with evidence of corrosion-induced damage Under-cut all exposed reinforcing steel by a minimum of ¾-inch. The shape of the prepared cavity should be square or rectangular in shape. The edges of the patches shall be saw-cut perpendicular to the surface to a minimum depth of ½-inch. Repair area shall be a minimum of ½-inch deep throughout. Use abrasive blasting to remove residual dust, debris, fractured concrete, and contaminants that prevent proper bonding. Following abrasive blasting, blow out repair areas with oil-free compressed air. The final surface texture should be rough with minimum ⅛-inch amplitude.

Treatment of exposed reinforcement: All signs of corrosion should be removed from exposed reinforcing steel by an abrasive blasting, wire wheel or needle scaler. If the cross-sectional area of the reinforcing steel has been significantly reduced, the engineer should be consulted. Prime reinforcing as recommended by the repair material manufacturer.

Installation

Surface Saturation: Saturate surface with potable water. The base concrete shall be in a saturated surface dry (SSD) condition prior to application of repair material to prevent a rapid loss of moisture from the repair material and into the substrate.

Mixing and Application of Repair Material: Mixing and application shall be in strict accordance with the manufacturer's instructions. Apply the material with adequate pressure before the bond coat dries. Thoroughly consolidate the repair material into the corners of the patch and around any exposed reinforcement in the repair zone. If a second lift is required, thoroughly roughen the surface of the first lift by scoring the soft mortar to achieve an aggressive finish, similar in profile to the prepared concrete substrate. If the second lift will not be immediately applied, keep the first lift moist until application of the second lift. Finish to match existing surface. Cure using curing compound.

Apply silane sealer as specified to exposed surfaces and edges of roof slab.

3.10 FORMING AND ACCESSORIES

3.11 Formwork

3.11.13 Structural Cast in Place Forming

Part 1 – General

The Contractor shall submit a construction joint plan to the Engineer for review prior to formwork and rebar installation if altered from that shown on the Plans. Modifications to the construction joints shall be submitted to the Engineer no less than 7 working days prior to placing the forms and rebar.

Part 2 – Products

Materials

Unless otherwise directed, coat contact surface of forms with colorless, non-staining, mineral oil that is free from kerosene, or other approved suitable material, to permit satisfactory removal of forms without concrete damage. Form-release agent for interior of potable water storage structures shall be National Sanitation Foundation Standard (NSF) No. 61 approved for use in direct contact with potable water.

Form construction for surfaces covered with backfill shall be made of steel, plywood, or dressed, matched lumber. Form construction for exposed surfaces shall be made of new plywood or steel without surface markings.

Form ties for use in liquid containment structures shall be standard plastic cone snap-ties with ¾-inch diameter neoprene waterstop washer or removable taper ties. Use Greenstreak X-plugs with removable taper ties or equal. Contractor shall submit to the Engineer form ties to be used for review prior to installation.

Part 3 - Execution

Installation/Construction

Concrete forms shall be sufficiently tight to prevent leakage of concrete or mortar and shall be properly braced or tied together to maintain desired position and shape until removed.

Conduits, pipes and sleeves of any material not harmful to concrete and within the limitations of ACI 318, Section 6.3 are permitted to be embedded in concrete with approval of the Engineer. Provide a ¾-inch chamfer or radius at all exposed corners and edges, unless specifically stated otherwise on the Plans.

Forms shall remain in place until the concrete has developed sufficient strength to withstand imposed loads without damage or deflection. Wall and slab forms shall remain in place for a minimum of 24 hours after completion of the pour. Forms for beams and suspended slabs shall remain in place for a minimum of 14 days AND until concrete has developed 28-day design strength, unless approved by the Engineer. The Contractor shall coordinate with the testing lab to verify concrete strength prior to form removal.

Do not allow water to flow through areas where forms are to be placed. During form construction and prior to placement of concrete, keep footings and floor slab areas free of standing water.

Field Quality Control

Variations from plumb, specified grade, conspicuous lines, and walls shall not exceed plus or minus ¼-inch in any 10-foot length, and shall not exceed one inch over the entire length. Variations from dimensions shall not exceed plus or minus ½-inch. Closer tolerances shall be achieved by the Contractor as necessary to accommodate equipment and other permanent materials.

3.15 Concrete Accessories

3.15.05 Pipe Penetrations through Concrete

Part 1 - General

Summary

Structures not holding water or unburied structures: Unless identified on the Plans, all pipes larger than two inches passing through poured-in-place concrete floors and walls shall be isolated from the concrete.

Part 2 - Products

Materials

Wrap the pipe in a flexible, non-biodegradable material such as high-density foam or asphalt board.

Part 3 - Execution

Examination

Wrapping must be inspected and approved by Engineer prior to concrete pour. Gaps, tears, or looseness in wrapping will be cause for rejection.

Installation

Wrapping shall be watertight and provide a minimum of ½-inch separation between the pipe and concrete. Extend wrapping a minimum of one inch above and below concrete pour and cut flush on accessible side(s) after curing.

3.15.19 Concrete Anchors

Part 1 - General

Quality Assurance

Installation of adhesive anchors shall be performed by personnel certified in accordance with the ACI/CRSI Adhesive Anchor Installer Certification Program. In lieu of certification the installer shall attend on-site training held by the adhesive manufacturer prior to the installation of adhesive anchors.

Part 2 - Products

Materials

Concrete Anchors shall be Hilti HIT 500-V3, Simpson SET-XP, or Powers PE1000+ Adhesive Anchors.

Threaded rod shall be stainless steel except in dry locations.

Part 3 - Execution

Installation

Install in accordance with Manufacturer's recommendations. Special Inspection in accordance with IBC, Section 17, must be provided. Provide a minimum of 48 hours' notice to Engineer prior to starting installation. Concrete anchors shall not be used to resist tension or fatigue loading without Owner's evaluation and approval.

Use threaded rod or reinforcing bar as shown on the drawing, and meeting Manufacturer's recommendations. Provide minimum embedment as shown. Holes shall be drilled with carbide-tipped drill bit. Holes shall be cleaned of dust and debris. Adhesive shall be inserted with a mixing nozzle.

3.20 REINFORCING

3.21 Reinforcement Bars

3.21.11 Plain Steel Reinforcement Bars

Part 1 - General

References

ACI – American Concrete Institute- latest edition

CRSI Manual of Standard Practice – latest edition

Part 2 - Products

Materials

Grade – ASTM A706, Grade 60

ASTM A615, Grade 60 shall be permitted if:

(a) The actual yield strength based on mill tests does not exceed fy by more than 18,000 psi; and,

(b) The ratio of actual tensile strength to the actual yield strength is not less than 1.25.

Detailing - ACI 318 and ACI 315

Lap requirements - See schedule on Plans or as required by ACI 318

Tie wire - 16 gauge minimum

Bar supports shall conform to "Bar Support Specification" CRSI Manual of Standard Practice, MSP-1-80. Provide Class 1, plastic protected bar supports. Use pre-cast concrete blocks to support bars off ground. Bar supports in water holding and buried structures shall be non-metallic.

Bar supports for the bottom rebar mat of suspended slabs or beams in water holding structures must be point supports (chairs or dobbies), not continuous.

Part 3 - Execution

Installation

Reinforcing steel shall be detailed in accordance with ACI 315and 318 and as shown on the Plans. Lap all reinforcements in accordance with "the reinforcing splice and development length schedule". Provide corner bars at all wall and footing intersections. Bend wire bar ties away from formwork to provide the same concrete clearance as shown on the Plans to the bars.

Welding of reinforcing steel shall not be performed unless specifically approved by the Engineer. If approved, Contractor will arrange and pay for all required Special Inspections associated with welding of reinforcing steel.

Field Quality Control

Reinforcing steel shall be free of rust and loose scale at time of concrete placement. Bars with kinks, improper bends, or reduced cross-section due to any cause will not be used. Bars shall not be field bent. Bars may not be tack-welded or otherwise heated.

If, within the project warranty period, rust spots appear on the concrete due to failure to achieve proper clearance on the rebar or wire ties, the Contractor shall grind out and patch the areas using a method satisfactory to the engineer.

3.30 CAST-IN-PLACE CONCRETE

3.30.05 Common Work for Cast in Place Concrete

Part 1 - General

Delivery

Concrete shall be transported in a truck mixer to the jobsite and discharged within 1.5 hours after cement has been added to water or aggregates. Rejected concrete will be at Contractor's expense.

Part 2 - Products

Components

If allowed, curing materials shall conform to ASTM C-171 and liquid membrane-forming compounds shall conform to ASTM C-309. When concrete is to be coated or stained, use UV-dissipating form release and curing compounds.

Part 3 - Execution

Preparation

Do not place concrete during rain, sleet, or snow until water and freezing protection is provided.

Position embedded items accurately, and support against displacement or movement during placement.

Fill voids in sleeves, insets, anchor slots, etc., temporarily with readily removable materials to prevent entry of concrete into voids.

Before beginning placement of concrete, remove hardened concrete and foreign materials from inner surface of mixing and conveying equipment. Before depositing concrete, remove debris from space to be occupied by the concrete. Secure reinforcement in position to prevent movement during concrete placement.

At the beginning of the concrete pour for walls taller than 8 feet, place a 1½ to 2½-inch thick grout pad prior to placing the concrete for the wall. Grout mix shall consist of fine aggregates, concrete and water in the same ratios as used in the wall concrete. The placement of the concrete shall proceed immediately after the grout placement so as to prevent any cold joints.

At construction joints, thoroughly clean surface of existing concrete to remove laitance. Roughen existing concrete surface to expose aggregate uniformly and apply approved bonding agent to existing concrete in accordance with manufacturer's recommendations. Prior to placing fresh concrete, dampen joint and coat with grout mixture in accordance with ACI 301, Section 8.5.

Installation

Placement shall be in accordance with IBC, Section 1905.

Place no concrete when air temperature is below or expected to be below 40 degrees during the 28-day curing period unless a low temperature concrete mix has been approved by the Owner. Provide adequate equipment for heating materials and protecting concrete during freezing or near freezing weather. Keep materials, reinforcement, forms, and ground in contact with concrete free from frost at time of placement. Heat mixing water as required. Use no materials containing ice.

Place no concrete when air temperature exceeds or is expected to exceed 85 degrees during the 28-day curing period unless a high temperature placement plan has been approved, and unless adequate precautions are taken to protect work. Cool ingredients prior to mixing. Flake ice or crushed ice of a size that will melt completely during mixing may be substituted for all or part of water. Cool forms and reinforcing prior to placing concrete.

Handle concrete from mixer, ready-mixed truck, or from transporting vehicle to place of final deposit by methods which prevent separation or loss of ingredients. Under no circumstances shall concrete that has partially hardened be deposited.

Place concrete in maximum lifts of 3 feet. Deposit concrete continuously so that no concrete will be deposited on concrete which has hardened sufficiently to cause formation of seams and planes of weakness within the section. If a section cannot be placed continuously, locate and reinforce construction joints at points as provided for in the Plans or as approved by the Owner. Maximum concrete drop shall be 5 feet.

Consolidate concrete by vibration, supplemented by hand spading, rodding, forking, or tamping. Thoroughly work concrete around reinforcement, around embedded items, and into corners of forms to eliminate air or rock pockets which may cause honeycombing, pitting, or planes of weakness. Insert and withdraw internal vibrators at points approximately 18 inches in each direction and extend into the lower concrete lifts. At each insertion, the

duration shall be sufficient to consolidate the concrete; but not sufficient to cause segregation. Do not use vibrators to transport concrete within forms. Consolidate slabs by utilizing vibrating screeds, roller pipe screeds, internal vibrators, or other approved methods. Have a spare vibrator available at jobsite during concrete placing operations.

After removal of forms, cut out and patch defects in concrete surfaces. Remove form tie cones. Cut or snap off form ties to a depth of ¾-inch. Chip out rock pockets, holes from form tie removal, and other defects to solid concrete. Repair defects in accordance with 3.01.30.71.

Curing

See section 3.39.

3.31 Structural Concrete

3.31.13 Heavyweight Structural Concrete

Part 1 - General

Summary

All concrete as shown on the Plans not used for liquid containment and below-grade structures, ringwalls, and mass concrete and not called out otherwise. Use water reducers as required to achieve slump. Hydraulic Concrete may be substituted.

Performance Requirements

28-day compressive strength - 4500 psi minimum

Slump - Without plasticizers; 4 inches for floor and roof slabs, 7 inches for walls. With plasticizers, maximum 9 inches or as desired for placement.

Part 2 - Products

Mixes

Water/cement ratio - 0.40 maximum

Nominal maximum aggregate size – ¾-inch (AASHTO Grading No. 67)

Entrained air ratio – 3.5 percent minimum to 6.5 percent maximum

3.31.30 Thrust Blocks, Driveways, Curb, Gutter, Sidewalks, Equipment Pads, and Fence Posts

Part 1 - General

Summary

All concrete for non-structural applications including thrust blocks, driveways, sidewalks, equipment pads, and fence post foundations. Hydraulic or Structural Concrete may be substituted.

Performance Requirements

28-day compressive strength – 4500 psi minimum

Part 2 - Products

Mixes

Water/cement ratio - 0.45 maximum

Nominal maximum aggregate size – ¾-inch (AASHTO Grading No. 67)

Entrained air ratio – 3.5 percent minimum to 6.5 percent maximum

3.35 Concrete Finishing

3.35.05 Common Work for Surface Finishing

Part 2 - Products

Finishes

Each concrete area that requires finishing shall conform to one of the following requirements:

- Generator Slab – Floated
- WTP Electrical Service Switchboard Slab - Floated

Part 3 - Execution

Preparation

Do not place concrete which requires finishing until the materials, tools, and labor necessary for finishing the wet concrete are on the job and acceptable to the Owner. If rainfall is possible, tent the work area prior to the pour and maintain protection until the concrete is cured sufficiently to resist damage.

3.35.54 Floated Finish

Part 3 - Execution

Construction

Consolidate, strike off, and level concrete; but do not work further until ready for floating. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit floating operations. Consolidate surface with power-driven floats. Hand floating may be used if area is small or inaccessible to power units.

Field Quality Control

Check surface planeness during or after first floating. Cut down high spots and fill low spots to produce surface with tolerance of ¼-inch in 10 feet in any direction. Refloat to a uniform, smooth, sandy texture immediately after leveling.

3.39 Concrete Curing

Part 2 - Products

Materials

Curing compounds are not permitted on surfaces that will receive coatings.

Part 3 - Execution

Installation

All concrete for structures, sidewalks, drives, curbs, shotcrete (see section 3.37), and where directed by the Owner, shall be water-cured in accordance with ACI 308.1 unless approved in advance by the Owner. If allowed, curing compound shall be applied immediately after finishing or form removal. When plastic or burlap covers are used to augment or protect curing, extend sheeting beyond the edges of the concrete and secure against wind lift. Inspect and adjust curing systems daily, including over weekends and holidays.

Division 4
Masonry – This Division Not Used

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Division 5
Metals – This Division Not Used

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Division 6
Wood, Plastics, and Composites – This Division Not Used

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Division 7
Thermal and Moisture Protection – This Division Not Used

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Division 8
Openings – This Division Not Used

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Division 9
Finishes – This Division Not Used

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10.00 GENERAL

This division covers that work necessary for fabricating and installing all furnishings and accessories as described in these specifications and as shown on the Plans.

Sections in these specifications titled "*Common Work for . . .*" shall apply to all following subsections whether directly referenced or not.

10.05 Common Work for Specialties

Part 1 - General

Submittals

Submittal information shall be provided to the Owner for the following items:

- Equipment Signs
- Fire Extinguishers

10.06.10 Schedules for Signage

Part 2 - Products

Materials

Unless otherwise specified, text shall be white on a background color shown below.

Purpose	**Plate Color**
General	Black
Warning	Red
Electrical	Black

Part 3 - Execution

Installation

Install signs/markers directly on the devices in a location that does not interfere with the device operation or maintenance. If the device is too small or otherwise impractical to mount marker, locate marker as close as possible to the device on an adjacent surface.

10.10 INFORMATION SPECIALTIES

10.14.23 Panel Signage

Part 2 - Products

Materials

Equipment Signage

1. Equipment signs shall be plastic-laminated 1-inch high, by required length, by ⅛-inch thick, with ½-inch high letters in N-2 Standard Gothic characters.

Electrical and Control Equipment

1. All components provided under this specification, both field- and panel-mounted, shall be provided with permanently-mounted nametags. The Engineer shall have complete control over the hardware to be labeled and the labeling provided. Provide labels as directed.
2. Provide a name tag for each piece of equipment and for each circuit and/or control device associated with the equipment.
3. Provide a nameplate for each control center unit door.
4. Electrical equipment name plates and service legends shall be phenolic-engraved, rigid, laminated plastic type with adhesive back. Letter height shall be $^{5}/_{16}$-inch unless specified otherwise on the Plans. Labeling shall clearly identify the associate component. Color shall be black background with white letters.
5. Warning nameplates shall be provided on all panels and equipment which contain multiple power sources which may have energized circuits with the main disconnecting means in the off position. Lettering shall be white on red background.
6. Tags shall be securely attached. Adhesive backed tags shall also have at least two brass screws for positive fastening.
7. Provide engraved nameplates indicating load served, voltage, and phase for every circuit breaker, panel board, switchboard, motor control center, motor starter, disconnect switch, and fused switch.

10.40 SAFETY SPECIALTIES

10.44.16 Fire Extinguisher

Part 2 - Products

Components

Portable, wall-mounted, 10-pound, dry-chemical fire extinguisher shall be listed and approved by Underwriters Laboratories. The fire extinguisher shall contain a dry chemical agent which is effective in extinguishing Class A, B, and C fires (tri-class), and shall be rated 2A-10B-C or greater.

Part 3 - Execution

Installation

Install extinguisher no higher than 5-feet above floor and in accordance with applicable codes.

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Division 11
Equipment – This Division Not Used

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Division 12
Furnishings – This Division Not Used

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Division 13
Special Construction – This Division Not Used

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Division 14
Conveying Systems – This Division Not Used

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Division 15
Mechanical – This Division Not Used

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Division 16
Electrical

16.00 GENERAL

The Contractor shall provide all labor, material, tools, equipment and services required to complete the furnishing, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical equipment, devices and components as indicated and implied by the plans and specifications.

Sections in these specifications titled "*Common Work for . . .*" shall apply to all following sections whether directly referenced or not.

The Contractor shall reference Division 1.25 regarding substitutes and "or-equals".

16.05 Common Work for Electrical

Part 1 - General

Summary

Plans are diagrammatic and indicate general arrangements of systems and equipment, except when specifically, dimensioned or detailed. The intention of the plans is to show size, capacity, approximated location, direction and general relationship of one work phase to another, but not exact detail or arrangement.

Regulatory Requirements

The Contractor shall coordinate and provide all permits, licenses, approvals, inspections by the authority having jurisdiction and other arrangements for work on this project and all fees shall be paid for by the Contractor. The Contractor shall include these fees in the bid price.

Related Sections

See the following sections for items that may be provided and/or installed with other electrical equipment.

- Division 10.14 Signs for electrical equipment
- Division 17 Automatic Control

Codes and Standards

Provide all electrical work in accordance with latest edition of National Electrical Code, National Electrical Safety Code, Oregon Electrical Specialty Code, and local ordinances. If any conflict occurs between government adopted code rules and these specifications, the codes are to govern. All electrical products shall bear a label from a certified testing laboratory recognized by the State of Oregon. Recognized labels in the State of Oregon are UL, ETL, and CSA-US.

Definitions

The words "plans" and "drawings" are used interchangeably in this specification and in all cases shall be interpreted to mean "Plans".

The word "provide" shall be interpreted to mean furnish and install.

Design Requirements

Unless otherwise noted, provide enclosures as follows:

1. Indoors Unclassified Locations: NEMA Type 12
2. Outdoors and/or Wet Locations: NEMA Type 4X
3. Electrical Rooms: NEMA Type 1

Submittals

Provide submittals of each item specified in this division to engineer for approval in accordance with Division 1 of these specifications. Submittals for motor control centers, motor control panels, control panels, instrumentation panels, and pump control panels shall include at a minimum: a wiring diagram or connection schematic, and an interconnection diagram.

Wiring Diagram or Connection Schematic

1. This plan or plans shall include all of the devices in a system and show their physical relationship to each other including terminals and interconnecting wiring in assembly. This diagram shall be in a form showing interconnecting wiring only by terminal designations (wireless diagram).

Interconnection Diagram

1. This diagram shall show all external connections between terminals of equipment and outside points, such as motors and auxiliary devices. References shall be shown to all connection diagrams which interface to the interconnection diagrams. Interconnection diagrams shall be of the continuous line type. Bundled wires shall be shown on a single line with the direction of entry/exit of the individual wires clearly shown. All devices and equipment shall be identified. Terminal blocks shall be shown as actually installed and identified in the equipment complete with individual terminal identification. All jumpers, shielding and grounding termination details not shown on the equipment connection diagrams shall be shown on the interconnection diagrams. Spare wires and cables shall be shown.

Submittal information shall be provided to the Owner for the following items:

1. Utility Meter Enclosure and Current Transformer Enclosure
2. Service Disconnect(s)
3. Surge Protective Device (SPD)
4. Switchboard
5. Electrical Distribution Engineered Bus (Metal Enclosed Busway)
6. Distribution Transformers
7. Branch Circuit Panelboard
8. Circuit Breakers
9. Conduit and Fittings

10. Outlet and Junction Boxes
11. Underground Marking Tape
12. Electrical Grounding
13. Electrical Handholes and Vaults
14. Wire and Cables
15. Alarm Button
16. Automatic Transfer Switch(es)
17. Manual Transfer Switch(es)
18. Engine Generator Set(s)
19. Load Bank
20. EG Fuel Tank
21. Other Electrical Components listed in this Division and/or required by the Engineer.

Project Conditions

Contractor shall keep all power shutdown periods to a minimum. Carry out shutdowns only after a shutdown schedule has been submitted and approved by both the Owner and the Engineer.

Water Treatment Plant

The Winchester Water Treatment Plant is a critical water source for the area and thus cannot be shut down for any significant amount of time. It is the responsibility of the Contractor to become familiar with the project, the existing facilities and the proposed improvements and develop a detailed shutdown and transition plan for the construction at the plant. The shutdown plan must include the following steps and abide by the criteria set forth. The shutdown plan must be submitted to the Owner and Engineer for review and approval prior to construction.

Step 1: The existing electrical trench, switchboard, and bus connections must be field evaluated by visual inspection to confirm material compatibility.

Step 2: The contractor shall install the proposed pad-mount transformer and vault, fuel tank, generator, and switchboard in the designated locations. A secondary electrical trench and conduit must be installed between the switchboard and the proposed electrical vault. Proposed raceways and conductors shall be installed (as much as possible) with extra conductor lengths coiled in preparation for final termination. The proposed generator shall be fully tested and commissioned and be ready for operation.

Step 3: The Contractor shall coordinate with the serving utility to inspect and confirm the pad-mount transformer and utility metering equipment in the switchboard will be pre-approved for energization.

Step 4: The Contractor shall provide to the site, (5) portable generators to power the treatment plant during the shutdown. The generators shall be used to power the five feeder circuits at the existing switchboard. The circuits shall be transitioned one at a time, and verified they are operational before beginning on the next transition. The maximum outage time for each feeder circuit is **1.5 hours**. At the Contractors discretion, and Engineer's approval, a larger generator may be provided with the necessary distribution circuit breakers to accommodate multiple circuits. Anticipated generator sizes for each circuit are as follows:

Circuit	Generator Size Minimum
MCC-C	**300 kW**
Panel LA and LB	**250 kW**
Intake Structure	**500 kW**
MCC-B	**800 kW**
MCC-A	**1000 kW**

The Contractor shall be fully responsible for operation, maintenance and fueling of the portable generators for the duration of their use. The Contractor shall implement a remote monitoring system that is capable of notifying of any generator outages, alarms or issues 24 hours per day. The Contractor shall make available emergency response personnel in the event of a generator failure or issue to remedy immediately. In the event of a generator failure, the Contractor shall temporarily connect the permanent 1,500 kW generator installed as part of this project to restore power to the circuit that is without power.

Step 5: Once all feeder circuits are energized by the portable generators the Contractor shall coordinate with the serving utility to de-energize the existing utility pad-mount transformer and current transformer enclosure. The existing pad-mount transformer, pad-mount transformer vault, current transformer, and current transformer vault shall be removed. Immediately after transformer removal, the Contractor shall remove the existing secondary conductors and electrical bus to the existing switchboard and install the proposed secondary conduit, conductors, electrical bus, and terminate. The maximum time permitted for this step is **96 hours** from the time the last circuit is placed on temporary generator power to when the circuits are transitioned back to permanent utility power.

Step 6: The serving utility shall energize the proposed utility pad-mount transformer, thus energizing the proposed switchboard and existing switchboard. The proposed switchboard shall be fully tested and commissioned, and then the feeder circuits shall be transitioned from the temporary generator power back to the existing switchboard feeder circuit breakers.

Construction Power

See Division 1.51

Part 2 - Products

Source Quality Control

Provide adequate space and fit for the electrical installation, including, but not limited to, determination of access-ways and doorways, shipping sections, wall and floor space, and space

occupied by mechanical equipment. Provide electrical equipment that fits in the areas shown on the Plans. All equipment shall be readily accessible for maintenance, shall have electrical clearances in accordance with National Electric Code (NEC) and shall be installed in locations which will provide adequate cooling.

Do not use equipment exceeding dimensions indicated or equipment or arrangements that reduce required clearances or exceed specified maximum dimensions unless approved by the Engineer.

Identification of Listed Products

Electrical equipment and materials shall be listed for the purpose for which they are to be used, by an independent testing laboratory. When a product is not available with a testing laboratory listing for the purpose for which it is to serve, the inspection authority may require the product 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.

Materials

Use equipment, materials and wiring methods suitable for the types of locations in which they will be located, as defined in Definitions above.

All materials and equipment specified herein shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.

Components

Fasteners for securing equipment to walls, floors, and the like shall be either hot-dip galvanized after fabrication or stainless steel. Provide stainless steel fasteners in corrosive locations. When fastening to existing walls, floors, and the like, provide capsule anchors, not expansion shields. Size capsule anchors to meet load requirements. Minimum size capsule anchor bolt is ⅜-inch.

Accessories

Wire Identification

1. Identify each wire or cable at each termination and in each pull-box using numbered and lettered wire markers. All electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panelboard circuits using the panelboard identification and circuit number. Identify motor control circuits using the equipment identification number assigned to the control unit by the motor control center manufacturer and the motor control unit terminal number. Identify other circuits as approved by the Engineer. Identify each wire or cable in each pull-box with plastic sleeves having permanent markings. Conductors between terminals of different numbers shall have both terminal numbers shown at each conductor end. The terminal number closest to the end of the wire shall be the same as the terminal number.

Finishes

Refer to each electrical equipment section of these specifications for painting requirements of equipment enclosures.

Part 3 - Execution

Installation

General

1. Complete the wiring, connection, adjustment, calibration, testing and operation of mechanical equipment having electrical motors and/or built-in or furnished electrical components in accordance with electrical code, UL listing requirements and manufacturer's instructions. Install electrical components that are furnished with mechanical equipment.
2. Provide the size, type and rating of motor control devices, equipment and wiring necessary to match the ratings of motors furnished with mechanical equipment.
3. Complete the procurement, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical devices, components accessories and equipment which is not shown or specified but which is nonetheless required to make the systems shown and specified properly functional.

Workmanship

1. Assign a qualified representative who shall supervise the electrical construction work from beginning to completion and final acceptance.
2. Provide all labor using qualified craftsmen, who have had experience on similar projects.
3. Ensure that all equipment and materials fit properly in their installations.

Field Services

1. 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 and operation of the equipment, and to correct any problems which occur during testing and start-up.

Installing Equipment

1. Provide the required inserts, bolts and anchors, and securely attach all equipment and materials to their supports.
2. Install all floor-mounted equipment on 3½-inch high reinforced concrete pads.
3. Install all equipment and junction boxes to permit easy access for normal maintenance.

Cutting, Drilling, and Welding

1. Provide any cutting, drilling, and welding that is required for the electrical construction work.
2. Structural members shall not be cut or drilled, except when approved by the Engineer. Use a core drill wherever it is necessary to drill through concrete or masonry. Perform patch work with the same materials as the surrounding area and finish to match.

Metal Panels

1. Mount all metal panels, which are mounted on, or abutting concrete walls in damp locations or any outside walls ¼-inch from the wall and paint the back side of the panels with a high build epoxy primer with the exception of stainless-steel panels. Film thickness shall be 10 Mils minimum.

Seismic Requirements

1. See Division 1.81.30

Load Balance

1. Balance electrical load between phases as nearly as possible on panelboards, motor control centers, and other equipment where balancing is required.
2. When loads must be reconnected to different circuits to balance phase loads, maintain accurate record of changes made, and provide circuit directory that lists final circuit arrangement.

Field Quality Control

Minor Deviations

1. The electrical plans are diagrammatic in nature and the location of devices, fixtures, and equipment is approximate unless dimensioned. On the basis of this, the right is reserved by the owner to provide for minor adjustments and deviations from the locations shown on the Plans without any extra cost. Deviations from the Plans and/or specifications required by code shall also be done, subsequent to Owner's approval, without extra cost.
2. Plans indicate the general location and number of the electrical equipment items. When raceway, boxes, and ground connections are shown, they are shown diagrammatically only and indicate the general character and approximate location. Layout does not necessarily show the total number of raceways or boxes for the circuits required. Furnish, install, and place in satisfactory condition all raceways, boxes, conductors, and connections, and all of the materials required for the electrical systems shown or noted in the contract documents complete, fully operational, and fully tested upon the completion of the project.

Project Record Plans

1. A set of Plans shall be maintained at the job site showing any deviations in the electrical systems from the original design. A set of electrical Plans, marked in red to indicate the routing of concealed conduit runs and any deviations from the original design, shall be submitted to the Engineer for review at the completion of the project prior to final acceptance.
2. After testing and acceptance of the project the Contractor shall furnish in the O&M manuals an accurate connection schematic and interconnection diagram for every service entrance panel, pump control panel, motor control center, and instrumentation panel provided this project.

Cleanup and Equipment Protection

Equipment Protection

1. Exercise care at all times after installation of equipment, motor control centers, control panels, etc., to keep out foreign matter, dust debris, and moisture. Use protective sheet metal covers, canvas, heat lamps, etc., as needed to ensure equipment protection.

Cleaning Equipment

1. Thoroughly clean all soiled surfaces of installed equipment and materials upon completion of the project. Clean out and vacuum all construction debris from the bottom of all equipment enclosures.

Painting

1. Repaint any electrical equipment or materials scratched or marred in shipment or installation, using paint furnished by the equipment manufacturer.

Final Cleanup

1. Upon completion of the electrical work, remove all surplus materials, rubbish, and debris that accumulated during the construction work. Leave the entire area neat, clean and acceptable to the Owner.
2. Lamps and fluorescent tubes shall be cleaned, and defective units replaced at the time of final acceptance.

16.10 ELECTRICAL SITE WORK

16.10.1 Common Work for Electrical Site Work

Part 1 – General

Summary

The work included in this section consists of furnishing and installing conduit, fittings, handholes, pull vaults, warning tape, cables, wires, and related items, complete as specified herein and as indicated on the Plans for a complete and functional underground electrical system. Special vaults, grounding, trench backfill requirements may be specified with the particular equipment or electrical system involved.

Related Sections

Raceways and conduit shall be provided per Section 16.70.

Wire and cable shall be provided per Section 16.60.

Design Requirements

Materials and equipment shall conform to the respective specifications and standards; and to be the specifications herein. Electrical rating shall be as indicated on Plans.

Part 3 – Execution

Construction

Provide all excavation, trenching, backfill and surface restoration required for the electrical work.

Trenching shall be to depths as required by Code, particular installation, or as shown on the Plans. Trench width and length as required by the installation or as shown. Trench bottom shall be free of debris and graded smooth. Where trench bottom is rock or rocky or contains debris larger than 1 inch or material with sharp edges, over excavate 3 inches and fill with 3 inches of sand. Separation between new electrical utilities and other utilities shall be 12 inches minimum, except gas line separation shall be 12 inches both vertical and horizontal. Perform crossing of concrete or asphalt only after surface material has been saw cut to required width and removed.

Backfill around raceways shall be 3-inches of pea gravel or sand for systems of 600 volt or less. Provide red marker tape over raceways below grade. Place backfill material to obtain a minimum degree of compaction of 95 percent of maximum density at optimum moisture content. Moisten backfill material as required to obtain proper compaction. Do not use broken pavement, concrete, sod, roots or debris for backfill.

16.10.2 Underground Marking Tape (Detectable Type)

Part 2 – Products

Manufacturers

Tape shall be Brady "Detectable Identoline – Buried Underground Tape", or equal.

Materials

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.

Part 3 – Execution

Installation

Unless noted otherwise on Plans, approved underground marking tape shall be installed in the trench 12 inches above and directly over the conduit or raceway.

16.10.3 Handholes and Pull Boxes

Part 2 – Products

Manufacturers

Handholes and Pull boxes shall be Utility Vault Co. or approved equal unless specified otherwise on the Plans.

Materials

Provide handholes of reinforced precast concrete, or injection molded composite plastic material. Handholes shall include a base, a body, extensions and a cover. Handholes with a perimeter of 10 feet or more (e.g., 3 feet by 2 feet) shall have both pulling irons and cable racks. All hardware shall be stainless steel, or hot-dip galvanized after fabrication; cable racking and hardware, however, shall be non-metallic and corrosion resistant. If no handhole size is shown on the Plans, size units per NEC or provide 12 inches by 24 inches by 18 inches deep, whichever is larger.

All handholes located in areas subject to vehicular traffic or where identified on Plans shall be ASSHTO, H-20 rated in accordance with ASTM C857.

The lids to all pull boxes and vaults shall be permanently marked for its intended use, "signal" for all signal and instrumentation handholes and "electrical" for all power handholes. Letter shall be a minimum of 3-inches high.

Part 3 – Execution

Installation

Conduits entering handholes shall have grounding bushings installed and the conduit ends shall be sealed with Permagum sealing compound. Where conduits enter through sides of handholes, the penetration shall be made watertight. Use a core drill wherever it is necessary to drill through concrete. Perform patch work with the same materials as the surrounding area and finish to match.

Pull boxes shall be provided at least every 150 feet on long straight runs. Spacing shall be reduced by 50 feet for each 90-degree bend.

Install handholes flush with finished grade in all paved areas, roadways and walkways. All handhole edges shall be flush with final surface.

16.15 Grounding and Bonding for Electrical Systems

Part 1 - General

References

Service and equipment grounding shall be per Article 250 of the NEC.

Performance Requirements

Verify that a low-resistance ground path is provided for all circuits so an accidental contact to ground of any live conductor will instantly trip the circuit.

Part 2 - Products

Components

The grounding systems shall consist of the ground rods, grounding conductors, ground bus, ground fittings and clamps, and bonding conductors to water piping and structural steel as shown on the Plans.

System components shall be as allowed in the NEC unless specified otherwise below:

1. Ground Rods: Ground rods shall be cone pointed copper clad Grade 40 HS steel rods conforming to ASTM B228. The welded copper encased steel rod shall have a conductivity of not less than 27 percent of pure copper.
2. Ground Conductors: Buried conductors shall be medium-hard drawn bare copper; other conductors shall be soft drawn copper. Sizes over No. 6 AWG shall be stranded. Coat all ground connections except the exothermic welds with electrical joint compound, non-petroleum type, UL listed for copper and aluminum applications.
3. Ground Rod Boxes: Boxes shall be a 9-inch diameter precast concrete unit with hot-dip galvanized traffic cover. Boxes shall be 12-inches deep minimum. Covers shall be embossed with the wording "Ground Rod".

Part 3 - Execution

General Grounding Installation

When available a UFER ground per latest edition of NEC shall be provided as the primary means to ground the electrical system.

Ground electrical service neutral at service entrance equipment to supplementary grounding electrodes.

Ground each separately derived system neutral to nearest effectively grounded building structural steel member or separate grounding electrode.

Provide a ground rod box for each ground rod to permit ready access to facilitate testing.

Provide a ground wire in every conduit carrying a circuit of over 110 volts to ground.

Make embedded or buried ground connections, taps and splices with exothermic welds. Coat ground connections.

Bond metallic water piping at its entrance into each building.

Vault and Handhole Grounding

Exposed noncurrent-carrying metal parts of equipment, conductor supports or racks, conduits and other metal appurtenances, including any metal cover and its supporting ring, shall be bonded together and connected to a common ground. The size of the grounding means shall be as prescribed in the NEC. Where the grounding means is exposed, the grounding conductor shall be not smaller than #8 AWG copper.

Ground Connections

Above grade ground connections shall be exothermic weld, mechanical, or compression-type connectors; or brazing.

Below grade ground connections shall be exothermic weld.

Install all ground connections is strict accordance with connector manufacturer's recommendations and methods.

Testing

Following completion of the grounding electrode system, if installed, measure ground resistance at each ground rod using the three-rod method. Submit results to engineer prior to final acceptance by the Owner.

Perform testing per NETA Standard ATS paragraph 7.13. Testing methods shall conform to NETA Standard ATS using the three-electrode method for large systems. Conduct tests only after a period of not less than 48 hours of dry weather.

Furnish to the Engineer a test report with recorded data of each ground rod location. See Division 16.95.4.

16.20 UTILITY SERVICE

16.21 Electrical Service

Part 1 – General

Description of Work

Work consists of removing the existing transformer and metering equipment at the Winchester Water Treatment Plant and replacing with a new transformer and service. Work also includes a new primary service to the new transformer.

Scheduling Work with the Utility Company

The Contractor shall be fully and completely responsible for all scheduling and coordination with the utility company. The Contractor shall coordinate and schedule power outages, power service for operation and construction, and power service as may be required prior to Certification of Occupancy.

The Contractor shall make all necessary applications for service with the utility and shall notify the Owner in writing of any obligations that the Owner must fulfill for service to be started, installed, or modified.

Contractor/Utility Interface Responsibilities

The electrical utility providing service to these facilities is Pacific Power.

The Contractor shall comply with all utility company standards and requirements.

All utility charges for and related to the final permanent service to the facility will be paid by the Owner, directly to the utility company and shall not be included in the Contractors bid price.

Contractor shall notify the Engineer/Owner of any changes to the responsibilities between the electrical utility and the Contractor as outlined in these specifications prior to submitting a bid. Any change(s) in responsibilities not brought to the attention of the Engineer prior to bidding will not be cause for additional payment.

The Contractor shall notify the Owner (in writing) of any obligations or forms that the Owner is responsible to provide for service.

The Contractor shall:

Install new raceway for primary service from the existing utility pole to the proposed pad-mount transformer location including trenching, backfill, and restoration. Install primary electrical service riser up pole to height required by serving utility.

Install new raceway and conductors for secondary service from the proposed pad-mount transformer location to the proposed service switchboard including trenching, backfill and restoration. Terminate service conductors at the service switchboard.

Remove the existing transformer and current transformer vault and equipment pad beneath the existing transformer and metering cabinet. Backfill and restore excavated areas.

Field-modify the existing concrete electrical trench, form and pour new concrete end to trench to allow for entry by sub-grade conduits as shown on the Plans.

The Utility Company shall:

De-energize and remove the existing pad-mount transformer and metering cabinet.

Install new primary conductors between the utility pole and proposed transformer location.

Terminate the proposed conductors on the primary and secondary side of the transformer.

Install current transformers (CT) in metering section of the switchboard installed by the Contractor.

Install a utility revenue meter in the proposed main revenue metering enclosure installed by the Contractor.

Project Conditions

Before submitting a bid, the Contractor shall become familiar with all the electrical service requirements that may affect the execution of their work.

Standards and Codes

Work involving service installation shall be done in accordance with the service utilities standards and the NEC.

Service equipment shall be listed and labeled by UL as "suitable for use as service equipment".

16.21.2 Electrical Utility Meter Enclosure

Manufacturers

Meter enclosure shall be provided as required to meet the requirement of the serving utility. Installation shall be in the service switchboard.

Materials

Contractor shall coordinate with the serving utility on the type of metering required and shall provide all labor and material necessary to meet their requirements.

16.21.6 Manual Transfer Switch

Part 1 - General

Design Criteria

Manual transfer switch shall consist of (2) two mechanically-interlocked molded case circuit breakers; kirk-locks are not acceptable, cam-style male connectors, power distribution block and grounding terminals, all housed within a padlockable enclosure.

Manual transfer switch enclosure shall be Type 3R, constructed of continuous seam-welded, Type 304 Stainless Steel.

The main access shall be through an interlocked, hinged door that extends the full height of the enclosure. Access for portable generator cables with female cam-style plugs shall be via a) drawn flange cable entry openings in the bottom of enclosure for wall mount units, or b) hinged lower door for pad mount units. A hinged flap door shall be provided to cover the cable openings when cables are not connected; the hinged flap door shall allow cable entry only after the main access door has been opened.

Number of male input cams shall not exceed the number as shown on the drawings and must be rated for the specified amperage.

Cam-style male connectors (inlets) shall be UL Listed single-pole separable type and rated 400 amps at 600VAC. Cam-style male connectors shall be color coded. Cam-style male connectors shall be provided for each phase and for ground, and shall also be provided for neutral if required. Each of the phase cam-style male connectors within the enclosure shall be factory-wired to a molded case circuit breaker. The ground cam-style male connectors shall be bonded to the enclosure, and a ground lug shall be provided for connection of the facility ground conductor. The neutral cam-style male connectors, if required, shall be factory wired to a power distribution block. None of the cam-style male connectors shall be accessible unless both molded case circuit breakers are in the "OFF" position and the main access door is open.

A power distribution block shall be provided for load-side field wiring. The power distribution block shall be factory wired to the molded case circuit breakers.

Molded case circuit breakers shall be UL Listed and the short circuit interrupt rating shall be a minimum of 35kAIC at 480VAC. Trip rating of the molded case circuit breakers shall be as shown on the drawings. One molded case circuit breaker shall be fed from utility power; the other molded case circuit breaker shall be fed from the cam-style male connectors to supply power from a portable generator. Both molded case circuit breakers shall include UL Listed door-mounted operating mechanisms (with provisions for a locking device), preventing the opening of the main access door unless both breakers are in the "OFF" position. Both molded case circuit breakers shall be mounted behind a deadfront panel. The load-side of the molded case circuit breakers shall not be energizable unless the main access door is closed and one of the molded case circuit breakers is in the "ON" position. The (2) molded case circuit breakers shall be safety interlocked by mechanical means to ensure that only one breaker can be closed at any given time.

Manual transfer switch shall be suitable for use as service equipment in the USA as defined by the NEC.

Manual transfer switch shall include permanently affixed operation instructions.

Part 2 – Products

Manufactured Units

The manual transfer switch shall be a StormSwitch by ESL Power Systems, or equal.

16.30 BASIC PANEL EQUIPMENT AND DEVICES

16.31 Operating and Indicating Devices

Part 1 - General

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.

16.31.1 Digital Power Meter

Manufacturers

The digital power meter shall be an Allen-Bradley, Powermonitor 5000, or equal.

Minimum Features

A digital 3-phase power monitor with remote capabilities and associated sensors shall be provided as indicated on the Plans. The digital power meter shall be capable of measuring at a minimum the following parameters:

1. Voltage (line-neutral)
2. Voltage (line-line)
3. Voltage unbalance
4. Current
5. Current unbalance
6. Neutral amps
7. Real power
8. Reverse and single-phase detection
9. Reactive power
10. Apparent power
11. Power factor
12. Frequency
13. Auxiliary voltage

Power meter shall have an RJ-45 Ethernet port for communicating with the facility control system. Power meter shall communicate with the control system via EtherNet/IP or Modbus TCP/IP communications protocol. An industrial Ethernet switch and 24 VDC power supply shall be installed in the switchboard power meter section for connecting the power meter

display, plant control system communications network, automatic transfer switch, and generator to the power meter. The Ethernet switch shall have a minimum of 8 ports and shall be an N-Tron 308TX or equal.

16.35 Control Panel Accessories

16.35.2 Nameplates

Part 2 – Products

Manufactured Units

Standard nameplates shall be made of $^{1}/_{16}$-inch thick machine engraved laminated phenolic having black letters not less than $^{3}/_{16}$-inch high on white background. One-inch high lettering shall be used for the large nameplates required for the control panels and motor control centers.

Part 3 – Execution

Installation

Nameplates shall be provided on all electrical devices including but not limited to motor control equipment, MCC cubicles, control stations, junction boxes, panels, motors, instruments, switches, indicating lights, meters, and all electrical equipment enclosures. Each motor control center compartment and control panel shall have a nameplate designating the equipment and its identifying number and size or rating. Data shall be as shown on the Plans and reviewed via the submittal process. Nameplates shall have name, number and/or function as is applicable for clear identification.

Provide one large nameplate for each motor control center and/or control panel identifying the equipment as indicated on the Plans.

Nameplates on steel panels shall be secured with stainless steel drive screws. Where it is proposed that nameplates will be secured with pressure sensitive tape or bonding cement, the process and samples shall be submitted to the Engineer for acceptance.

Nameplates shall be provided for identifying all operator interface (lights, switches, etc.) and other devices that are located outside or inside the panels.

Nameplates shall be provided for identifying all relays and devices that are located inside the panels.

Special Functions

Provide warning nameplates on all panels and equipment, which contain multiple power sources. Lettering shall be white on red background.

16.36.1 Surge Protection Device (SPD)

Part 2 – Products

General

The SPD shall be compatible with the electrical system voltage, current, system configuration, and intended applications.

Manufacturers

The SPD shall be provided by the same manufacturer as the switchboard in which it is installed.

Manufactured Units

Protect the electrical service with an SPD device as shown on the Plans. The SPD shall be mounted in the switchboard and connected with the shortest conductors possible. The SPD shall meet the following:

1. Provide surge current withstand up to 500 kA per phase.
2. Short circuit current rating of 200 kAIC.
3. A ten-year free replacement warranty.
4. Enhanced UL 1283 Transient Tracking Filter.
5. Status indicator lights for each phase and one service LED.

16.50 PANELBOARDS

16.51 Low Voltage Service Switchboard

Part 1 - General

Description of Work

This section covers furnishing and installing a complete low voltage service switchboard as shown on the Plans and detailed within these specifications.

Design Requirements

The low voltage service switchboard shall be NEMA 3R outdoor construction, with pull section and breaker section configuration as shown on the Plans. Incoming feeder shall enter the pull section from the bottom. Outgoing feeders shall exit breaker section from the bottom. Equipment sizes shall not exceed the measurements shown on the plans without prior approval from the Engineer.

Standards and Codes

The switchboard shall meet all applicable UL, NEMA, NEC, and local code requirements for service entrance equipment, and shall contain all barriers required to isolate fused and non-fused conductors. The switchboard shall be furnished with a UL service entrance label.

Part 2 - Products

Manufacturer

Acceptable manufacturers shall be as follows:

- Siemens
- Schneider Electric (Square D)
- Eaton (Cutler-Hammer)

Manufactured Units

The switchboard shall be deadfront with front only accessibility. The framework shall be code gauge steel, rigidly welded. Floor sills and lifting means shall be provided. The color shall be manufacturer's standard gray.

The bus shall be tin plated copper of sufficient size to limit the temperature rise to 65 degrees Celsius, based on UL tests. Bus bracing shall be rated at least 65kA rms unless noted otherwise on the Plans.

The switchboard manufacturer shall be responsible for coordination, proper phasing, and internal busing to the outgoing busway.

The switchboard manufacturer shall be responsible for coordination and installation of the automatic transfer switch.

Provide utility current transformer compartment as shown on Plans that meets the requirements of the utility providing service.

A full-size neutral bus and code sized ground bus shall be provided. All buses shall be extended into the pull section and shall be mounted in the lower half of the equipment.

Molded-case circuit breakers with fixed frames shall be provided to serve feeders. Breakers shall have the frame and trip size as indicated on the Plans and shall be rated 100 percent. The breakers shall be rated a minimum 65k A.I.C. and be microprocessor controlled to monitor short time, long time, and instantaneous trip functions where indicated on the Plans.

The breakers shall have Ground Fault Protection and Indication equipment as required by the NEC in Article 230-95. All ground fault equipment shall be factory installed and tested by the Manufacturer. Any coordination or communication equipment between ground fault protection circuit breakers shall be furnished as part of the completed equipment.

Power Monitoring

Customer owned metering equipment (Division 16.31.1) and associated sensors shall be provided by the Contractor in the pull section of the equipment as indicated on the Plans. See also Division 16.31.1 for digital power meter requirements. Provide ethernet switch and power supply as shown on the Plans. Refer to Division 17.33 for Network Equipment specifications.

Utility Metering Section

The switchboard shall have a metering section built in compliance with the serving utility's requirements for current-transformers and the utility meter base. The meter section shall meet all criteria specified in the serving utility's handbook.

Surge Protection Device (SPD)

See Division 16.36.1

Automatic Transfer Switch (ATS)

See Division 16.92

Part 3 – Execution

Testing

The switchboard shall be factory tested with the Engineer present. Supplier shall coordinate with Engineer minimum 30 days prior to factory testing to schedule.

This equipment shall be tested and placed into operation by a qualified factory representative trained in start-up and troubleshooting procedures for equipment being installed.

Breakers installed in the low voltage service switchboard shall be fully tested and adjusted for coordinated trip settings by the Manufacturer of the switchboard following field installation of the equipment but prior to final inspection by the Engineer. The Manufacturer shall perform a protective device coordination study in accordance with Article 6.6 of the NETA, Acceptance Testing specifications. The Manufacturer shall furnish completed certified test reports to the Owner, indicating tests performed and all trip settings.

16.52 Panelboards

Part 1 - General

Description of Work

This section covers the furnishing and installation of all panelboard equipment complete.

Quality Assurance

Provide products specified in this Section that are listed and labeled as defined in NEC Article 100.

Standards and Codes

All materials and equipment specified herein shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.

All material and equipment specified herein shall conform with all applicable NEMA, ANSI, and IEEE standards.

All materials and equipment specified herein, and their installation methods shall conform to the latest published version of the NEC.

Part 2 – Products

Manufacturers

Materials, equipment, and accessories specified in this section shall be products of:

- Eaton/Cutler-Hammer
- Schneider Electric/Square D Company
- Siemens

Panelboards shall be of the same manufacturer as equipment furnished under Section 16.50, Low Voltage Motor Control.

Components

Panelboard Type

1. Panelboards shall be rated at proper voltage and current for intended use with bus bars of copper. Panels shall be 3-phase, 4-wire, 100 percent neutral, with equipment ground bar unless noted otherwise. Panelboards shall be dead front.

Wire Terminations

1. Panelboard assemblies, including protective devices, shall be suitable for use with 75 degrees Celsius or greater wire insulation systems at NEC 7 degrees Celsius conductor ampacity in accordance with UL 486E.

Load Current Ratings

1. Unless otherwise indicated, load current ratings for panelboard assemblies, including bus and circuit breakers, are non-continuous as defined by NEC. Continuous rating shall be 80 percent of non-continuous rating.
2. Where indicated "continuous", "100 percent", etc., selected components and protective devices shall be rated for continuous load value shown.
3. The following interrupting capacity shall be considered minimum. Other ratings shall be as specified on the Plans.

240V and 208Y/120V Panelboards	22,000 AIC symmetrical
480V/277V Panelboards	40,000 AIC symmetrical

Overcurrent Protective Devices

1. In accordance with NEMA AB 1, NEMA KS 1, UL 98 and UL 489, protective devices shall be adapted to panelboard installation.
2. Panelboards shall be capable of device replacement without disturbing adjacent devices and without removing main bus.
3. Spare Spaces: Cover openings with easily removable cover.
4. When not identified on Plans, provide minimum of 18 single-pole breaker spaces.

Circuit Breakers

1. Provide thermal-magnetic unless otherwise indicated, quick-make, quick-break, molded case, of indicating type showing ON/OFF and TRIPPED positions of operating handle. Mount breakers in all panelboards so that the breaker handles operate in a horizontal plan.
2. The bus connection shall be bolt-on circuit breakers in all panelboards. In power distribution panelboards, 225-ampere frame sizes and greater may be plug-in type where individual positive locking device requires mechanical release for removal.
3. Trip Mechanism:
   a) Individual permanent thermal and magnetic trip elements in each pole.
   b) Test button on cover.

c) Variable magnetic trip elements with a single continuous adjustment 3X to 10X for frames greater than 100 amps.

d) Two and three pole breakers shall have common trip.

e) Automatic opens all poles when overcurrent occurs on one pole.

f) Calibrated for 40 degrees C ambient, unless shown otherwise.

Ground Fault Circuit Interrupter (GFCI)

1. Where indicated, equip breaker as specified above with ground fault sensor rated to trip on 5-mA ground fault with 0.025 second (UL 943, class A sensitivity, for protection for personnel).
2. Ground fault sensor shall be rated same as circuit breaker.
3. GFCI shall have a push-to-test button and a reset button.

Equipment Ground Fault Interrupter (EGFI)

1. Where indicated, equip breaker as specified above with ground fault sensor rated to trip on 30-mA ground fault (UL listed for equipment ground fault protection).

Cabinets for Each Panelboard

1. Cabinets shall be flush, or surface mounted as indicated on the Plans with tight closing doors without play when latched. Where two cabinets are located adjacent to each other in finished areas, provide matching trim of the same height.
2. Provide cabinets of sufficient dimensions to allow for future expansion and addition of circuit breakers within the panelboards as indicated on the Plans.
3. Provide locks for each cabinet door. All electrical distribution equipment locks are to be keyed identically.
4. Fasten panelboard with machine screws with oval countersunk heads, finish hardware quality, with escutcheons or approved trim clamps. Clamps assessable only when dead front door is open are acceptable. Surface mounted panelboards with fronts greater than 48 inches vertical dimension shall have trim hinged at the right side in addition to the hinged door over dead front.
5. Material for Type 1, Type 3R, and Type 3S cabinets shall be code-gauge, hot-dip galvanized sheet steel with reinforced steel frame.
6. Finish all enclosures with rust inhibitor primer followed by manufacturer's standard gray baked enamel or lacquer.

Bus

1. Material for internal bus shall be full size copper throughout length. Provide for mounting of future protective devices along full length of bus regardless of number of units and spaces shown. Machine, drill and tap as required for current and future positions.

Feeder Lugs

1. Main and neutral feeder lugs shall be replaceable, bolted mechanical or crimp compression type.

Equipment Ground Terminal Bus

1. Provide copper equipment ground terminal bus with suitably sized provisions for termination of ground conductors. The terminal bus shall be bonded to the enclosure.
2. Provide individual mechanical termination points no less than the quantity of breaker pole positions.
3. Provide individual termination points for all other grounding conductors such as feeder, grounding electrodes, etc.

Neutral Terminal Bus

1. Provide copper neutral terminal bus with suitably sized provisions for termination of neutral conductors. The neutral bus shall be isolated from the enclosure.
2. Provide individual mechanical termination points no less than the quantity of breaker pole positions.
3. Provide individual termination points for all other neutral conductors.
4. Termination points shall be bolted crimp compression lugs for conductors 6 AWG or larger.

Part 3 – Execution

General

Install in accordance with NECA 407, NEMP PB 1.2 and manufacturers' written installation instructions.

Installation

Install securely, plumb, in-line and square with walls.

Install top of panelboard trim 72 inches above floor, unless otherwise shown. Install panelboard so tops of protective device operating handles are no more than 72 inches above the floor.

Install filler plates in unused spaces.

System of Numbering and Bus Arrangement

System numbering and bus arrangement shall be as shown on the panel schedule on the Plans.

Panelboard Nameplate

Provide engraved plastic nameplate with ½-inch high characters for panel identifications (for panel name) attached with screws to each panelboard front. Include voltage, phase and wire (i.e., 208Y/120, 3-phase, 4-wire) in ⅜-inch characters.

Circuit Index

Provide as-built information for each branch circuit panelboard by circuit with its proper load designation.

Ground Fault Protection

Install panelboard ground fault circuit interrupter devices in accordance with installation guidelines of NEMA 289.

16.55 Switches and Protective Devices

16.55.1 Common Work for Switches and Protective Devices

Part 1 - General

Design Requirements

Overcurrent devices shall be NEMA rated.

Extra Materials

Provide one fuse for each ungrounded conductor and a minimum of one spare fuse per phase of each ampacity and voltage used on the project. Deliver fuses to Owner at the completion of the project.

Part 3 – Execution

Installation

Overcurrent protection devices and safety switches shall be centered 60 inches above the finished floor unless noted otherwise on the Plans.

16.55.13 Fuses

Part 1 - General

Design Requirements

Fuses shall be of the type and amperage indicated on the Plans. The voltage rating shall be appropriate for the application indicated. The fuse types indicated on the Plans imply a certain set of fuse characteristics. No substitutions of fuse types will be allowed without Engineer approval.

Part 2 - Products

Manufacturers

Fuses shall be:

- Bussman,
- Gould Shawmut
- Littlefuse
- Reliance

- Or Equal

Materials

Fuses in motor circuits which are indicated but not sized, shall be provided with Manufacturer's recommended size based on the actual motor installed. In-line or integrally-mounted fuse clips shall be provided on all control power or low-voltage transformers.

16.55.16 Molded Case Circuit Breakers

Part 1 - General

Design Requirements

Breakers shall have the interrupting rating and trip unit type and rating indicated on the Plans. All breakers shall be calibrated for operation in an ambient temperature of 40 degrees Celsius.

Part 2 - Products

Manufactured Units

Molded case circuit breakers shall be quick-make and quick-break type with wiping type contacts. Each breaker shall be provided with arc chutes and individual trip mechanisms on each pole consisting of both thermal and magnetic trip elements. Two and three pole breakers shall be common trip. Molded case circuit breakers shall be trip-free. Each breaker shall have trip indication independent of the "ON" or "OFF" positions.

16.60 CONDUCTORS

16.61 Low Voltage Wire and Cable

Part 1 - General

Design Requirements

This section is for power and control conductors for 600 volts or less.

All conductors shall be copper. Wire or cable not shown on the Plans or specified, but required, shall be of the type and size required for the application and in conformance with the applicable code.

Part 2 - Products

Materials

Conductors

1. Solid and stranded copper wire shall be 600-volt Type THW, THWN, or THHW, Class B stranding, sizes #14 AWG, #12 AWG, and #10 AWG only. Use of THHN insulation shall not be allowed. Aluminum conductors shall not be allowed.
2. Stranded copper wire shall be 600-volt Type XHHW, Class B stranding, sizes #8 AWG and larger. Aluminum conductors shall not be allowed.

Splices

1. For Lighting Systems and Power Outlets: Wire nuts shall be twist-on type insulated connectors utilizing an outer insulating cover and a means for connecting and holding the conductors firmly.
2. All Equipment: Crimp type connectors shall be insulated type, suitable for the size and material of the wires and the number of wires to be spliced and for use with either solid or stranded conductors.
3. Division 16 Equipment and Power Conductors: Bolted pressure connectors shall be suitable for the size and material of the conductors to be spliced.
4. All Equipment: Epoxy splice kits shall include epoxy resin, hardener, mold, and shall be suitable for use in wet and hazardous locations.

Terminations

1. Crimp type terminals shall be self-insulating sleeve type, with ring or rectangular type tongue, suitable for the size and material of the wire to be terminated, and for use with either solid or stranded conductors.
2. Terminal lugs shall be split bolt or bolted split sleeve type in which the bolt or set screw does not bear directly on the conductor.
3. Wire Markers shall be plastic sleeve type. Wire numbers shall be permanently imprinted on the markers.

Finishes

Color Coding: Provide color coding for all circuit conductors. Insulation color shall be white for neutrals and green for grounding conductors. An isolated ground conductor shall be identified with an orange tracer in the green body. Ungrounded conductor colors shall be as follows:

1. 120/208 Volt, 3 Phase: Red, black and blue.
2. 277/480 Volt, 3 Phase: Yellow, brown and orange.
3. 120/240 Volt, 1 Phase: Red and black.

Part 3 – Execution

Location (Installment) Schedule

Provide the following conductors for the following applications:

1. Use stranded copper conductors for all power and control circuits unless noted otherwise on plans or below. Size as noted on the Plans.
2. Contractor may use solid copper conductors for lighting and receptacle circuits using screw-type terminals. Size as noted on the Plans.
3. Size #14 AWG wire or smaller shall not be allowed on power circuits.

Installation

Conductor Splices

1. Splices: Install all conductors without splices unless necessary for installation, as determined by the Engineer. Splices when permitted shall be completed using an approved splice kit intended for the type of conductor and the application. The splice shall be in accordance with the splice kit manufacturer's instructions.
2. Underground Splices: All underground outdoor splices when approved by Engineer shall be completed in an accessible pullbox or handhole using an approved watertight epoxy resin splice kit rated for the application up to 600 volts. Splices will not be allowed to be direct buried.

Conductor Identification

1. Except for interior lighting and receptacle circuits, identify each wire or cable at each termination and in each pullbox, junction box, handhole, and manhole using numbered and lettered wire markers. All electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panelboard circuits using the panelboard identification and circuit number. Identify motor control circuits using the equipment identification number assigned to the control unit by the motor control center manufacturer and the motor control unit terminal number. Identify other circuits as shown in the circuit schedule as favorably by the Engineer.
2. Conductors between terminals of different numbers shall have both terminal numbers shown at each conductor end. The terminal number closest to the end of the wire shall be the same as the terminal number.

Testing

Insulation Resistance Tests: For all circuits 150 volts to ground or more and for all motor circuits over ½ horsepower, test cables per NETA Paragraph 7.3.1. The insulation resistance shall be 20 megohms or more. Submit results to Engineer for review.

16.63 Signal Cable

Part 2 - Products

Materials

Twisted Shielded Pairs (TSP)

1. Cable shall conform to IEEE 383, UL 13, and UL 83 and shall be type PLTC cable suitable for direct burial. Each TSP shall consist of two #16 AWG, 7-strand copper conductors per ASTM B8 with 15 Mils PVC insulation and individual conductor jacket of nylon. Conductors shall be twisted with 2-inch or shorter lay, with 100 percent foil shielding and tinned copper drain wires. The cable shall have an overall PVC jacket with a thickness of 35 Mils. The insulation system shall be rated at 90 degrees Celsius and for operation at 600 volts.

Cat 5E Ethernet Cable

1. The Ethernet cable shall be shielded 600V UL rated. The use of a 300V rated cable is not acceptable. All Ethernet cable terminating outside of a telemetry panel shall be grounded at the telemetry panel only.
2. Ethernet cables shall be industrial type Ethernet cable and UL listed for installation in the Motor Control Center. Ethernet cables shall be Allen-Bradley Ethernet Cable with metal In-cabinet RJ45 Connectors, no substitutions.

Fiber Optic Cable

1. Fiber optic cable shall be OM3 multi-mode fiber cable with a minimum of 12 fibers. Cable jacketing shall be black and OFNR riser rated for vertical-run and general use. Provide cable with high grade PVC molded strain relief. Each fiber optic cable terminating at a fiber optic patch panel shall have an SC connector. Each fiber optic cable terminating at a switch shall have an SC connector. Cables shall be listed and marked in accordance with the requirements of the NEC. Cables shall be Corning FREEDM Loose Tube, Indoor/Outdoor, Gel-Free cables or equal.
2. Fiber optic patch cable shall be a duplex multi-mode fiber optic patch cable. Cable jacketing shall be yellow. Provide cable with high grade PVC molded strain relief. Each fiber optic patch cable shall have an SC connector for terminating at the patch panel and an SC connector for terminating at the switch.

Part 3 - Execution

Installation

Cable Installation

1. Cables shall be continuous from initiation to termination without splices.
2. Cable shielding shall be grounded at one end of the cable only. Bonding shall be to a single ground point only. Bonding from cable to cable in multiple run installations shall not be permitted.
3. Install instrumentation cables in separate raceway systems with voltages not to exceed 30 volts DC.

Conductor Identification

1. Except for interior lighting and receptacle circuits, identify each wire or cable at each termination and in each pullbox, junction box, handhole, and manhole using numbered and lettered wire markers. All electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panelboard circuits using the panelboard identification and circuit number. Identify motor control circuits using the equipment identification number assigned to the control unit by the motor control center manufacturer and the motor control unit terminal number. Identify other circuits as shown in the circuit schedule as determined by the Engineer.
2. Conductors between terminals of different numbers shall have both terminal numbers shown at each conductor end. The terminal number closest to the end of the wire shall be the same as the terminal number.

Testing

Insulation Resistance Tests: Perform insulation resistance on all circuits. Make these tests before any equipment has been connected. Test the insulation with a 500 Vdc insulation resistance tester with a scale reading 100 mega ohms. The insulation resistance shall be 20 mega ohms or more. Submit results to Engineer for review.

16.70 RACEWAYS, BOXES, AND FITTINGS

16.71 Raceways

Part 1 – General

Design Requirements

Conduit sizes not noted on Plans shall be in accordance with NEC requirements for the quantities and sizes of wire installed therein.

Part 2 – Products

Components

Conduit and Fittings

1. Galvanized Rigid Steel (GRS): Rigid conduit shall be steel, hot dipped galvanized inside and out. The GRS must meet USA Standards Institute C80-1 Underwriters Laboratories Standard UL6 and carry a UL label. Use cast threaded hub fittings and junction boxes for all rigid conduit except in locations not permitted by the NEC.
2. PVC Coated Rigid Steel Conduit (PVC-GRS): PVC coated conduit shall meet the GRS standard above plus have a 40 Mil PVC factory applied PVC coating.
3. Nonmetallic Conduit: Nonmetallic Conduit shall be rigid PVC, Schedule 40 (PVC-40) or 80 (PVC-80). PVC conduit installed above grade shall be Schedule 80 extra heavy wall 90 degree Celsius. UL listed for aboveground use and UV resistant. Conduit shall be gray in color. Fittings shall be of the same material as the raceway and installed with solvent per the Manufacturer's instructions. Conduit, fittings, and solvent shall all be manufactured by the same Manufacturer.
4. Flexible Metal Conduit (Flex-LT): 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. Flexible conduit shall be American Brass Company Sealtite Type VA, General Electric Type UA or equal.
5. Electrical Metallic Tubing (EMT): EMT shall be UL 797 and ANSI C80.3; steel tubing, hot dipped galvanized. EMT fittings shall be ANSI/NEMA FB 1; steel, rain tight, insulated throat, compression type.

Conduit and Cable Supports

1. Conduit Supports: Hot dipped 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

support for PVC or PVC coated rigid steel shall be one-hole PVC or epoxy coated clamps or PVC conduit wall hangers.

2. Ceiling Hangers: Ceiling hangers shall be adjustable galvanized carbon steel rod hangers. Unless otherwise specified, hanger rods shall be ½-inch all-thread rod and shall meet ASTM A193. Hanger rods in corrosive areas and those exposed to weather or moisture shall be stainless steel.

Conduit Sealants

1. Moisture Barrier Types: Sealant shall be a non-toxic, non-shrink, non-hardening, putty type hand applied material providing an effective barrier under submerged conditions.
2. Fire Retardant Types: Fire stop material shall be a reusable, non-toxic, asbestos-free, expanding, putty type material with a 3-hour rating in accordance with UL 1479. Provide products indicated by the manufacturer to be suitable for the type and size of penetration.

Part 3 - Installation

Raceway Applications

Galvanized Rigid Steel (GRS) conduit shall be used in all locations unless noted otherwise below or on the Plans.

ABOVE GRADE CONDUITS (non-corrosive areas) shall be:

1. GRS for power and control wiring.
2. GRS for instrumentation and telecommunications wiring.
3. GRS for motor leads from VFDs.
4. EMT for above-grade lighting circuits.

ABOVE GRADE CONDUITS (wet or corrosive areas, NFPA 70 hazardous areas) shall be:

1. PVC-GRS for power and control wiring.
2. PVC-GRS for instrumentation and telecommunications wiring.
3. PVC-GRS for motor leads from VFDs.

CONCEALED ABOVE GRADE CONDUITS shall be:

1. GRS for all wire and cable types in wood stud frame walls.
2. PVC-40 for power and control wiring in concrete block or brick walls.
3. PVC-40 for instrumentation and telecommunications wiring in CMU or brick walls.
4. GRS for motor leads from VFDs in CMU or brick walls.

BELOW GRADE CONDUITS IN DIRECT EARTH (not under slabs-on-grade) shall be:

1. PVC-40 for power and control wiring.
    a) Sweeps and risers for transition of PVC from below grade to above grade shall be PVC-GRS.

2. PVC-GRS for instrumentation and telecommunications wiring.
3. PVC-GRS for motor leads from VFDs.

UNDER SLABS-ON-GRADE CONDUIT shall be:

1. PVC-40 for power and control wiring
    a) Sweeps and risers for transition of PVC from below grade to above grade shall be PVC-GRS.
2. PVC-GRS for instrumentation and telecommunications wiring.
3. PVC-GRS for motor leads from VFDs.

CONCRETE-ENCASED CONDUITS shall be:

1. PVC-40 for power and control wiring
    a) Sweeps and risers for transition of PVC from below grade to above grade shall be PVC-GRS.
2. PVC-40 for instrumentation and telecommunications wiring.
    a) Sweeps and risers for transition of PVC from concrete-encasement to above grade shall be PVC-GRS.
3. PVC-GRS for motor leads from VFDs.

ALL CONNECTIONS TO VIBRATING EQUIPMENT OR MOTORS shall be:

1. Liquidtight flexible metallic conduit for indoor, non-corrosive areas and all motor leads from VFDs.
2. Connection to equipment outdoors or in corrosive areas shall be with non-metallic liquidtight flexible conduit (except for motor leads from VFDs shall be flexible metallic.)

Installation

Size of Raceways:

1. Raceway sizes as shown on the Plans, if not shown on the Plans, then size in accordance with NFPA 70.
2. Unless specifically indicated otherwise, the minimum raceway size shall be:
    a) Conduit: ¾-inch

All raceways shall contain a separate grounding conductor.

Spare conduits shall contain one $^{3}/_{16}$-inch diameter nylon pull rope.

Conduit routing is shown diagrammatic on the Plans. Contractor is responsible for routing the conduits in a neat manner, parallel and perpendicular to walls and ceilings.

Location of conduit ends are shown approximately. Contractor is responsible for ending conduits in location that will not conflict with electrical equipment. Route conduit ends to facilitate ease of equipment maintenance. Conduits extending from the floor to a device shall be located as close as possible to avoid creating a hazard.

Conduit shall not be routed on exterior of structures except as specifically indicated on the Plans.

Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.

Securely fasten raceways at intervals and locations required by NEC, or the type of raceway employed.

Provide all required openings in walls, floors and ceilings for conduit penetration.

1. Do not install one (1) inch and larger raceways in or through structural members (beams, slabs, etc.) unless approved by Engineer.
2. New Construction: Avoid cutting openings, where possible, by setting sleeves or frames in masonry and concrete, and by requesting openings in advance.
3. Existing Construction: Core drill openings in masonry and concrete. Avoid structural members and rebar.

Conduit encasement or embedment in the earth shall be separated from the earth by at least 3-inches of concrete unless otherwise shown on the Plans. Plastic conduit spacers shall be located five feet on centers. The spacers shall be secured to the conduits by wire ties. The conduits shall be watertight.

Analog signal conduits shall be separated from power or control conduits. The separation shall be a minimum of 12-inches for metallic conduits and 24-inches for nonmetallic conduits.

Install explosion-proof seal-offs in hazardous areas shown on the Plans and as required by the NEC.

Plastic raceway joints shall be solvent cemented in accordance with recommendations of raceway manufacturer.

All conduit openings not encased in a panel shall be sealed with duct seal.

16.72 Boxes and Enclosures

16.72.2 Outlet and Junction Boxes

Part 1 – General

Design Requirements

In corrosive areas, all junction boxes shall be NEMA 4X.

Outlet boxes and switch boxes shall be designed for mounting flush wiring devices.

Outlet boxes shall not be less than 4-inch square and 1½-inch deep. Ceiling boxes shall withstand a vertical force of 200 pounds for five minutes. Wall boxes shall withstand a vertical downward force of 50 pounds for five minutes.

Part 2 – Products

Materials

Use cast boxes with threaded hubs for all rigid and intermediate conduits. Steel boxes may be used with rigid and intermediate conduits where cast boxes are not allowed by the NEC. All boxes shall be of proper size to accommodate devices, connectors, and number of wires present in the box. Boxes shall be readily accessible.

Cast box bodies and cover shall be cast or malleable iron with a minimum wall thickness of ⅛-inch at every point, and not less than ¼-inch at tapped holes for rigid conduit. Bosses are not acceptable. Mounting lugs shall be provided at the back or bottom corners of the body. Covers shall be secured to the box body with No. 6 or larger brass or bronze flathead screws. Boxes shall be provided with neoprene cover gaskets. Outlet boxes shall be of the FS types. Boxes shall conform to FS W-C-586C and UL 514.

Sheet metal boxes shall conform to UL 50, with a hot-dipped galvanized finish conforming to ASTM A123. Boxes and box extension rings shall be provided with knockouts. Boxes shall be formed in one piece from carbon-steel sheets.

Non-metallic boxes shall be hot-compressed fiberglass, one-piece, molded with reinforcing of polyester material, with a minimum wall thickness of ⅛-inch.

Finishes

Where only cast aluminum is available for certain types of fixture boxes, an epoxy finish shall be provided.

16.75 Wiring Devices

16.75.1 Common Work for Wiring Devices

Part 3 - Execution

Installation

Wiring Devices

1. Position of Outlets: All outlets shall be centered with regard to building lines, furring and trim, symmetrically arranged in the room or outside the structure. Device outlets shall be set plumb and shall extend flush to the finished surface of the wall, ceiling or floor without projecting beyond the same.
2. Unless otherwise noted, wall mounted outlet devices shall generally be 24-inches above the floor, 18 inches in architecturally treated areas, above process piping near process valve boards. Switches shall be 48 inches above the finished floor unless otherwise noted.

Installation of Wall Plates

1. Interior Dry Locations: Install plates so that all four edges are in continuous contact with the finished wall surfaces. Plaster filled will not be permitted. Do not use oversize plates or sectional plates.
2. Exterior and/or Wet Locations: Install plates with gaskets on wiring devices in such a manner as to provide a rain tight weatherproof installation. For receptacle devices, these

plates shall maintain the weatherproof rating with an attachment plug inserted and be rated extra-duty. Cover type shall match box type.

Testing

After installation of receptacles, circuits shall be energized, and each receptacle tested for proper ground continuity, reversed polarity, and/or open neutral condition.

GFI receptacles shall be tested with the circuits energized. Devices shall be tested with a portable GFI receptacle tester capable of circulating 7.5 milliamperes of current, when plugged in, between the "hot" line and "ground" to produce tripping of the receptacle. Resetting and tripping shall be checked at least twice at each GFI receptacle.

Submit results of all field testing to the Engineer for review.

16.75.2 Receptacles

Part 1 – General

Design Requirements

Receptacles shall be heavy duty, high abuse, grounding type conforming to NEMA configurations, NEMA WD1 and UL 514 Standards.

Part 2 – Products

Materials

Single and Duplex Receptacles

1. Indoor Clean Areas: Receptacles shall be duplex, 20 amp, NEMA 5-20R, and shall accept NEMA 5-15P and 5-15P plug caps. Receptacles shall be Hubbel 5362, General Electric 4108-2, or equal. Color shall be brown in industrial areas and ivory or white in office and laboratory areas.
2. Outdoor, Process, or Corrosive Areas: Receptacles shall be duplex, 20 amp, NEMA 5-20R, and shall accept NEMA 5-15P and 5-20P plug caps. Receptacle and plug caps shall be corrosion resistant, marine duty with yellow polycarbonate weatherproof lift covers. Receptacles shall be Hubbell 53CM62/53CM21 or equal.

GFI Receptacles

1. Device shall be rated 20 amp, 2-pole, 3-wire, 120-volt, conforming to NEMA WD1.10 configuration. Device shall have a test and reset push buttons. GFI device shall be Hubbell 5362 or equal.

Surface Multiple Outlet Assemblies

1. Units shall have outlets on center-to-center spacing as shown on the Plans. Assembly shall conform to Article 353 of the NEC.

16.75.3 Line Voltage Switches

Part 2 – Products

Manufacturers

- Sierra Electric
- Monumental Grade, Catalog No. 5721
- Daniel Woodhead 1900 series
- Or Equal

Materials

Line Voltage Types: Switches shall be rated 20 amps at 120 or 277 volts AC only. Units shall be flush mounted, self-grounding, quiet operating toggle devices. Handle color shall be brown in industrial areas and white or ivory in office or laboratory areas. Units shall conform to Federal Specifications W-S-896 D and E, UL 20, and NEMA WD1 standards.

16.75.5 Plates

Part 1 – General

Design Requirements

Plates shall be of the style and color to match the wiring devices, and of the required number of gangs. Plates shall conform to NEMA WD1, UL 514, and ANSI C73. In noncorrosive indoor areas, device plates shall be made of sheet steel, zinc electroplated with chrome finish.

Device plates in corrosive or outdoor areas shall be corrosion-resistant/marine-duty type with weather protective double doors. Device plates for explosion-proof equipment shall be factory provided with the equipment.

Part 2 – Products

Manufacturers

As manufactured by

- Crouse-Hinds
- Appleton
- Or Equal

Components

Device plates shall be provided with engraved laminated phenolic nameplates with ⅛-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.

16.75.6 Metal-Enclosed Busway

Part 1 - General

References

The assemblies shall be constructed, wired and tested in accordance with all applicable sections of the latest listed standards and codes.

A. NEMA - National Electrical Manufacturer Association

B. ANSI C37.23 - American National Standards Institute

C. NFPA 70 - National Electrical Code

Part 2 - Products

Manufacturers

Busway shall be manufactured by Technibus Company, or equal.

Housing

The bus duct shall be non-ventilated outdoors and indoors. Housing and accessory flanges, terminal enclosures, etc., shall be primed and painted corrosion resistant aluminum construction. All outdoor hardware exposed to the weather shall be stainless steel. Indoor hardware (unless in corrosive environment) shall be manufacturer's standard.

Bus housing shall be aluminum.

Outdoor, totally enclosed, non-ventilated housings shall be fitted with screened in sufficient quantity and rating to minimize condensation.

All housing and flange gasketing shall be EPDM or other noncorrosive material and shall be completely concealed for protection against deterioration.

The temperature rise at any point on the housing shall not exceed 30° C above an ambient temperature of 40° C.

A fire-resistant divider or barrier shall be provided at all points where the bus duct extends through building walls.

Phase Bus Bars

Bus bars shall be full round edge rectangular 98% IACS copper of sufficient cross-section to provide full current rating without exceeding a hot spot temperature rise of 65° C in a 40° C ambient.

Phase bus bars shall be mounted and secured against movement during short-circuit in tracking-resistant, glass-reinforced polyester blocks, or an approved equal, spaced along the bus run as required to meet the short-circuit current rating. The support blocks can be ribbed to provide long creepage paths and fitted with corona suppressors, consisting of silicone rubber inserts between the insulated bus bars and support blocks.

Phase bus bars, at 5 kV class and above, shall be insulated with epoxy, rated for continuous operation at 130° C.

Contact surfaces of copper bus bars shall be silver plated electrically by tank or brush method. Contact surfaces of aluminum bus bars shall be electro-tinned. All bus bar connections shall be bolted. Bolts shall pass through the bus bar conductors and shall be capable of being properly torqued and locked in place, to provide and maintain full and uniform pressure under all operating conditions. (Torque requirements in ft/lbs shall be furnished by Manufacturer.) In no case shall the temperature of such bus bar joint exceed 65° C above an ambient temperature of 40° C. An internal ground bus shall be furnished which will electrically connect together all equipment connected to the bus duct. If the bus duct enclosure is so constructed and connected that it provides a continuous path for ground current, it may serve as the ground bus. If the enclosure is used as the ground bus, a tooth type lock washer shall be furnished under each bolt head and each nut at connections between sections of bus duct. If the enclosure is not so constructed, the bus duct shall be furnished with a copper ground bar inside the housing. The ground bus shall have suitable terminating pads for connections to existing facility ground system.

Flexible connectors shall be provided if connecting bus to porcelain apparatus bushings. All necessary adapter bars and spacers, bolting hardware and insulating materials, for connections to transformer or switchgear terminals, shall be provided and the proper coordination of connections between bus and terminal equipment shall be the responsibility of the bus Manufacturer.

Contractor shall provide Manufacturer with applicable switchgear and field dimensions for matching and coordination requirements prior to fabrication.

Ratings

The maximum hot-spot temperature rise at any point in the bus, at continuous rated load, shall not exceed 65° C above an ambient temperature of 40° C.

The ratings of the bus duct shall be:

1. Voltage Class: 600 Volts 4W + GRD
2. Continuous Current Rating: 4000 Amperes
3. Short Circuit Rating: 65 KAIC.
4. Basic Insulation Level (BIL): 30 kV

Supports

Bus duct supports, if required, shall be outdoor column type with base plates for attaching to Contractor-provided foundations

16.90 POWER GENERATION

16.91 Engine Generator

This project includes four generators:

- Winchester Water Treatment Plant – 1500 kW Outdoor Generator
- Reservoir Hill – 35 kW Outdoor Generator

- Trailer-Mounted Portable Generator 1 – 150 kW
- Trailer-Mounted Portable Generator 2 – 150 kW

All generators shall be provided by the same manufacturer.

16.91.2 Diesel Engine Generator Sets

Part 1 - General

Definitions

Operational Bandwidth: The total variation from the lowest to highest value of a parameter over a range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

Standby Rating: Power output rating equal to the power the generator set delivers continuously under normally varying load factors for the duration of the power outage.

Local Availability: A manufacturer's authorized dealer with a service department that is within 200 miles of the project installation site.

Winchester Water Treatment Plant

Design Criteria

A. Provide a self-contained, exterior rated standby engine generator system to automatically operate the load criteria listed in the rating section of these specifications during prime power failure conditions.

B. Insulate, enclose, or guard exposed parts subject to high-operating temperatures or energized electrically, and moving parts which are of such nature or so located as to be a hazard to operating personnel. Safety devices and safety measures shall not impair the proper functioning of any part of the set.

C. Parts which require adjustment or servicing (not repair or replacement) to permit operation of the sets shall be arranged to provide optimum ease of servicing. Adjustment, repair, and replacement of parts, assemblies, and accessories shall be possible with minimum drainage and minimum disturbance of set. Maintenance shall be possible by use of common tools.

D. Design, construct, and install complete engine generator set to be free from objectionable vibration in any mode. Freedom from torsional vibration shall be demonstrated during factory test performed on the set provided, and proof of torsional acceptability shall be provided by the manufacturer.

Performance Criteria

A. The engine generator set provided shall not have a standby rating less than 1,500 kW at 0.8 PF with fan. Rating of diesel engine-generator set shall be based on operation of set when equipped with all necessary operating accessories such as radiator, fan, air cleaners, lubricating oil pump, fuel injection pump, jacket water pump, and governor charging generator.

B. Generator shall meet the following requirements:

1. Standby rating – 1,500 Kilowatt
2. Voltage – 480/277 volts
3. Phase – 3 phase
4. Frequency – 60 Hertz
5. Insulation – Class H
6. Wiring – 12 lead reconnectable
7. Ambient Temperature – 115 degrees F (max), -20 degrees F (min)

C. Allowable temperature rise in the generator shall not exceed 257 degrees F over 104 degrees F ambient temperature.

D. 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 3rd order harmonics or their multiples. Telephone influence factor shall be less than 40.

E. The generator set shall accept a single step load of 100% of rated load at 0.8 power factor and recover to rated speed and voltage as required in NFPA 110.

F. 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.

G. 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%.

H. 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.

I. The generator specified for this project was sized using Cummins PowerSuite software at 1500 kW with alternator P734E; the submitted generator shall be an equal. Due to variations by generator manufacturers and the software used by manufacturers for determining the size of a generator, it is the Contractor's and generator supplier's responsibility to verify the size of the generator to ensure that the generator will perform as specified. All sizing reports shall be submitted by the Contractor and approved by the Owner prior to equipment order. If the supplier/Contractor prepared sizing report requires a larger generator than was is specified, the larger generator shall be provided at no additional cost to the Owner.

Submittals

A. The following information shall be furnished:

1. Evaluation of engine generator size based on starting requirements. Provide calculations verifying transient voltage dip will not exceed 15 percent of the nominal voltage with application of (4) stepped loads, each representing 25 percent of the generators rated capacity, with submitted generator and alternator.

2. Plan of diesel generator set offered showing interconnecting wiring diagrams; all wiring in unit and on Plans shall be number coded.
3. Literature describing the diesel engine generator set.
4. Literature describing auxiliary equipment to be furnished.

B. The following shall be furnished in tabular form:

1. Engine make
2. Number of cylinders
3. Bore (in inches)
4. Stroke (in inches)
5. Generator make and type
6. Generator electrical rating, kVA
7. Cubic inch displacement Fuel oil consumption
8. Exciter and type
9. Horsepower at rated load
10. Enclosure size, exterior dimensions

C. Provide factory test results. See Source Quality Control below.

1. Provide field test results. See Site Test requirements under Part 3 of this specification.
2. Provide five (5) copies of manufacturer's operating and maintenance instructions for each piece of equipment. Information shall be complete and in suitable form for ready use by Owner's operations staff. Catalog cuts and information regarding spare parts shall be included. Operating manuals and instructions shall be assembled in hardback binders.

Project Conditions

1. Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
2. Minimum Temperature: 0° F
3. Maximum Temperature: 115° F.
4. Relative Humidity: 0-95 percent
5. Altitude: Sea level to 1200 feet

Coordination

A. Coordinate size and location of concrete bases for package engine generator set and fuel tanks. Cast anchor-bolt inserts into concrete bases. Concrete, reinforcement and formwork requirements are specified with concrete.

B. Coordinate size and location of roof curbs, equipment supports, roof penetrations and wall penetrations for exhaust systems.

Quality Assurance

A. The engine generator set shall be supplied by a manufacturer who has been regularly engaged in the production of engine-generators sets and associated controls for a minimum of twenty years, thereby identifying one source of supply and responsibility. The packaged engine generator set and auxiliary components shall be provided through one source from a single manufacturer.

B. The manufacturer shall provide factory-trained service and parts support through a factory authorized dealer/supplier that is regularly doing business in the area of installation. The factory authorized dealer/supplier shall maintain a service center capable of providing training, parts, and emergency services within 50 miles of the project site.

Warranty

A. The electrical standby system, including the engine generator set, exerciser and transfer switch, shall be guaranteed for 2 years or 1,500 hours operation from date of start-up service and acceptance, whichever occurs first.

Extra Materials

A. A set of specialty tools necessary for routine maintenance of the equipment shall be furnished.

B. The following spare parts shall be furnished:

3 - Sets of fuel filter elements and gaskets

3 - Lubricating oil filter elements and gaskets

3 - Air cleaner filter elements

2 - Complete sets of V-belts including fan and alternator drive belts

Part 2 – Products

Manufacturers

A. Subject to compliance with these specifications, the following manufacturers are approved for bidding:

1. Cummins
2. Caterpillar
3. Kohler
4. MTU

B. Ensure engine generator and accessories are provided by the above named manufacturer and its authorized dealer. Ensure local availability of service and replacement parts.

Manufactured Units

A. The general design of the engine generator furnished shall be manufacturer's standard, except where it differs from the requirements of these specifications. Engine shall, as a minimum, be in accordance with requirements of this specification and may be

manufacturer's standard commercial product with added features needed to comply with these requirements. Additional or better features which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial products, shall be included in the engine generator being furnished. A standard commercial product is a product which has been or will be sold on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

Components

A. Generator

1. Generator shall be a revolving field, 4-pole brushless connection to the alternator. Generator rotor shall have been dynamically balanced and aligned with the engine, and connected to the engine using a flexible disc coupling.

B. Voltage Regulator

1. Engine-generator unit shall have a steady state voltage regulator. 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 15%.

2. Supply generator with a voltage level control to provide an adjustable output voltage of plus/minus five percent. Mount voltage control device on engine control panel.

C. Electric Starting System

1. Engine shall be equipped with electric starting system of sufficient capacity to crank engine at a speed which will allow for full diesel start of the engine. Arrange starting pinion to disengage automatically when diesel engine starts.

2. Furnish storage batteries with rack having sufficient capacity for cranking engine for at least 30 seconds at firing speed in ambient temperatures specified and with capacity for starting diesel engine a minimum of three times in immediate succession. Batteries and rack shall be easily removable without disassembly of engine components.

D. Cooling System

1. Cooing system shall consist of frame-mounted radiator with engine water pump fan assembly and fan guard. Radiator capacity shall be adequate using engine fan cooling to maintain safe operation at 115° F ambient temperature.

2. Provide an engine thermostat to regulate engine water temperature as recommended by the manufacturer. Included in the cooling loop shall be a high-coolant temperature device to shut down engine through the engine control panel when engine temperature is excessive.

3. Provide cooling system water heaters suitable for operation on the voltage indicated on the Plans to maintain engine water temperature at 120 degrees F at an ambient temperature of 50 degrees F. Heaters shall be Kim jacket heaters or approved equal. Provide thermostatically controlled heaters. The coolant heater shall be UL 499 listed and labeled. Fill engine cooling system with a mixture of water, anti-freeze, and

corrosion inhibitor to provide freezing protection at an ambient temperature of -20 degrees F.

E. Air Cleaners

1. Engine shall be provided with one or more dry-type air cleaners of sufficient capacity to effectively protect working parts of the engine from dust, grit, and ash.

F. Governor System

1. An electronic governor system shall provide automatic isochronous frequency regulation. 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 cool down at idle function.

G. Lubrication

1. Engine shall have gear-type lubricating oil pump for supplying oil under pressure to main bearings, crank pin bearings, pistons, piston pins, timing gears, camshaft bearings, and valve rocker mechanism.
2. Provide effective lubricating oil filter, and locate and connect it so that lubricating oil is continuously filtered and cleaned. Filters shall be accessible, easily removed and cleaned, and equipped with spring-loaded bypass valve as insurance against stoppage of lubricating oil circulation in event the filters become clogged.
3. Engine shall have suitable lubricating oil cooler, either air-cooled or water-cooled, and provisions for draining oil by piping or other means to the outside of engine housing.

H. Frame

1. Engine shall be factory-assembled and aligned on a heavy-duty steel base with integral fuel tank. Batteries shall be housed in an acid-resistant box, which shall be mounted on engine frame and adjacent to the engine. Location of battery housing shall not interfere with maintenance and inspection of the engine. Construct the frame to insure proper alignment of all rotating parts and to prevent vibration build-up. Base shall permit skidding in any direction during installation and shall be provided with suitable holes for foundation bolts and vibration isolators. Provide vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer. Isolators shall include seismic restraints if required by the site location.
2. Set shall have provision for conveniently attaching hoisting slings as well as for fork lift pick-up.

I. Sound-Attenuated Enclosure

1. The generator enclosure shall be a walk-in weather protected enclosure. The enclosure should be capable of allowing the generator set to run at 100% full load continuously up to an ambient temperature of 104 F without overheating or shutdown while maintaining a maximum 0.5 inch of water column of static pressure within the enclosure. The enclosure shall include the generator load bank, and the cooling system shall accommodate the heat generation of the load bank while maintaining operation

in the specified ambient temperature rating of the equipment. See Section Q of this specification for load bank information. The enclosure shall be designed to comply with wind and snow loads demanded by local building codes, but with a minimal design to withstand a 100 mph wind load and tested to withstand 4 inches of rain per hour. Openings shall be screened to limit access of rodents into the enclosure. The enclosure shall include provisions to allow for lifting with spreader bars. The enclosure shall be designed to reduce the overall noise level at full load operation to a maximum of 75 dba at any location, 23ft from the generator set, in a free field environment.

2. Enclosure is to be designed for drop over mount on structural concrete slab on grade. See Plans for slab details.
3. Enclosure shall be built as a formed standing seam construction for wall and roof panels and constructed of the following minimum materials and methods:
    a. Wall panels will be 14 gauge galvannealed ASTM A-653.
    b. Roof panels will be 12 gauge galvannealed ASTMA-653
    c. Use of enclosure wall and roof mounting channels – 7 gauge hot rolled A 653 sheet steel
    d. Be of modular construction
    e. All roof and wall panel seams will be caulked or gasketed.
    f. The roof will be sloped to promote water run-off
    g. Roof mounted equipment mounting racks make from ASTM A 36 structural steel
    h. Designed to withstand wind, snow and seismic loads as per IBC code.
    i. Enclosure mounted intake and discharge air acoustic hoods or plenums
    j. Baffles as required for sound attenuation as determined by analysis of published engine data.
    k. The air intake shall be designed and constructed to minimize water penetration; airflow velocity shall not exceed 1250 FPM.
    l. 4x lifting lugs (marked 'Enclosure Removal Only')
    m. If headroom above radiator is less than 12", a fill access panel shall be installed for easy access.
    n. Designed to withstand snow loads, live loads and dead load as per IBC and local codes.
4. Air Handling will be designed to meet the cooling and sound requirements
    a. Air intake sound hood (hood turned down)
    b. Non-Combustible Thermal / Acoustical mineral wool
    c. 22 gauge G90 galvanized perforated sheet steel insulation cover

d. Air intake sound attenuator, galvanized construction, sized for the air flow and sound attenuation specified.

e. Air intake bird screen

f. Air discharge gravity damper aluminum or galvanized construction

g. Air discharge sound hood – vertical discharge

h. Non-Combustible Thermal / Acoustical mineral wool

i. 22 gauge galvanized sheet steel insulation cover

j. Air discharge sound attenuator, galvanized construction, sized for the air flow and sound attenuation specified.

k. Lifting eyes for hood removal / installation

5. The enclosure shall include wall and roof insulation sufficient to handle the site thermal and sound requirements Non-Combustible Thermal / Acoustical mineral wool
6. Flame Spread = 0, Smoke Developed = 0, Moisture Sorption = .04%
7. Insulation thickness to be determined based on sound requirements
8. 22 gauge G90 galvanized perforated sheet steel insulation cover
9. Engine exhaust muffler grade to be determined by specified noise level (75 dBA).
    a. Exhaust muffler shall be supported and mounted internally within the enclosure. Mounting of muffler to meet seismic requirements per IBC.
    b. The exhaust shall exit through the enclosure roof and terminate vertically with a rain cap.
    c. The muffler and discharge elbow are to be protected by a high temperature blanket or insulated muffler as required for proper operation and safety.
    d. Incorporate rain collar and rain shield for the generator exhaust muffler piping to prevent the entry of rainwater.
    e. All exhaust piping (including the silencer) shall be stainless steel.
10. Doors and hardware shall be provided furnished as follows:
    a. 4 doors personnel doors with locks shall be provided
    b. Neoprene gasket single sealed around door perimeters
    c. Rain drip lips over all doors
    d. Bolting and mounting hardware will be stainless steel
    e. Interior door release handles(allowing egress from inside when door is locked)
    f. Include hold open latches and door strike panel or bumper
    g. Door thickness to maintain R values and acoustical noise levels
11. Paint requirements, All exterior galvannealed surfaces will be:

a. Solvent cleaned per SSPC-SP1 and painted

b. Primer – Inhibitive Epoxy Primer 4-8 Mils DFT

c. Finish – Amercoat Polyurethane 2-5 Mils DFT

d. Color to be determined by Owner. Provide sample of colors to select from, not less than 8 alternatives.

12. Paint requirements, All carbon steel surfaces will be: Color to be determined

    a. Solvent clean carbon steel surfaces per SSPC-SP1 and SSPC-SP3

    b. Primer – Inhibitive Epoxy Primer –4-8 Mils DFT

    c. Finish – Amercoat Polyurethane 2-5 Mils DFT

13. Provide step-down transformer with an electrical AC distribution panel to feed the generator set and enclosure accessories. All electrical is mounted & wired to the distribution panel with surface mounted EMT galvanized conduit with EMT compression connections. The enclosure has the following electrical requirements:

    a. Input Power: 480 VAC, with 30 kVA 120/208 three phase transformer.

    b. AC distribution panel - 120/208 volt three phase, 100 amp main

    c. Stub up access for in-coming electrical feed to panelboard

    d. Four (4) AC LED lights in vapor tight fixtures

    e. Two (2) 3-way AC light switches

    f. Two (2) internal duplex ground fault receptacles

    g. Two (2) internal LED DC lights

    h. One (1) 0 to 60 minute timer for DC lights

    i. Two (2) exterior lights – LED with photocell

    j. Battery charger mounting and wiring to distribution panel

    k. All wiring shall be in EMT conduit and seal tight

14. Enclosure to be compliant with IBC 2006 and regional codes with certification to:

    a. FAS Factory Assembled Structures (Oregon State). P.E. registered in Oregon to provide stamped calculations and drawings to the state for review during the certification process.

15. The enclosure will have emergency egress doors (minimum of 2) positioned toward the rear (or control end) of generator set.

16. Minimum walk-around space of 24" shall be provided on each side of frame rail.

17. From generator load circuit breakers shall be minimum 42" of NEC clearance by opening doors.

18. Steps and exterior platform if door threshold is above 24 inches

19. Gravity Back draft damper with motor operated air intake damper (power open – spring close)
20. Mechanical Options
    a. Fuel 'fill and return' lines piped to exterior of enclosure for remote fuel tank.
21. Electrical Options:
    a. External GFI receptacle
    b. External E-Stop pushbutton
    c. 4 x DC light fixtures with timer operating from genset batteries
    d. Exterior LED light with photocell
    e. Emergency light with 2-hour battery pack
    f. Wire factory mounted engine jacket water heater to distribution panel
    g. Wire factory mounted alternator anti-condensation heater to distribution panel
    h. Mount engine cranking battery set & wire

J. Exhaust System

1. Muffler shall be rated as necessary to comply with City of Roseburg noise emission standards, and shall be furnished with the engine. The muffler and engine combination shall be sized to meet the power supply rating.
2. All exhaust piping and fittings shall be stainless steel. Provide stainless steel supports as necessary for a secure rigid pipe system.
3. Exhaust system for the diesel engine shall conform to codes set forth in the National Fire Protection Association, Volume 4, Section 211, and shall comply with recommendations for exhaust systems as specified by the diesel engine manufacturer.
4. Pitch horizontal runs of exhaust pipe downward, away from engine. Completely support the exhaust system so no weight or stress is applied to engine exhaust manifold or turbocharger.
5. Provide a condensate drain for the muffler through a petcock.
6. The entire exhaust system shall be wrapped in an insulation blanket rated to withstand a minimum temperature of 1200°F. The exterior blanket shall be protected with a 0.016 aluminum jacket with weatherproof end cap.

K. Fuel System

1. Engine shall operate on automotive diesel fuel complying with the limiting requirements of ASTM grade low sulfur Diesel Fuel #2 and the requirements of the engine manufacturer. Diesel engines requiring a premium fuel will not be considered.
2. Injection pumps and injection valves shall be a type not requiring adjustment in service and shall be capable of quick replacement by ordinary mechanics without special diesel experience.

3. Fuel injection pumps shall be positive action, constant-stroke pumps, actuated by cam-driven gears from engine camshaft.
4. Fuel lines between injection pumps and valves shall be of heavy seamless tubing and, to eliminate irregularity of fuel injection shall be the same length for all cylinders.
5. Equip fuel system with racor-type, water-removing fuel filter, having replaceable elements which may be easily removed from their housing for replacing, without breaking any fuel line connections or disturbing fuel pumps or any other part of engine. Locate all fuel filters in one accessible housing, ahead of injection pumps so that fuel will have been thoroughly filtered before it reaches the pump. No screen or filter requiring cleaning or replacement will be used in the injection pump or injection valve assemblies.
6. Generator Fuel Tank. Refer to ***Section 16.93***.
7. Install fuel storage system according to diesel engine manufacturer's recommendations and conform to the National Fire Protection Code and Uniform Building Code.

L. Fuel

1. Fill fuel tank completely full at completion of construction.

M. Control Panel and Alarm System

1. The Engine control panel shall be integrally mounted to the engine generator assembly on the generator at the opposite end of the radiator. It shall be enclosed in a NEMA 4 enclosure.
2. The control panel shall include a color LCD, backlit touchscreen for EG operation, controls and alarming.
3. Control panel shall include 24-hour data logging of all generator operations and alarming, with event history.
4. The control shall have automatic remote start capability from a panel-mounted three-position (Stop, Run and Remote) switch.
5. The generator set control shall indicate the existence of the following alarm and shutdown conditions on the display panel:
    a. <u>Alarms</u>
        i. Low oil pressure warning
        ii. Oil pressure sender failure
        iii. Low coolant temperature
        iv. High coolant temperature warning
        v. Low coolant level
        vi. Engine temperature sender failure
        vii. Low DC voltage
        viii. High DC voltage

ix. Weak battery
x. Low fuel warning
xi. Overload
xii. Battery Charger Malfunction
xiii. Overcurrent
xiv. Under Frequency

b. Shutdown Alarms
i. Low oil pressure
ii. Low-Low Fuel
iii. High coolant temperature
iv. Fail to crank
v. Overcrank
vi. Overspeed
vii. High AC voltage
viii. Low AC voltage
ix. Under frequency
x. Over current
xi. Short circuit
xii. Emergency stop

c. Engine control panel shall include the following:
i. Oil pressure gauge (psi)
ii. Emergency Stop Pushbutton
iii. Coolant temperature gauge (°F)
iv. Operating hour meter (hrs)
v. Hand-off Auto Selector switch (H-O-A)
vi. AC Frequency meter (hertz)
vii. AC Volt meter (0-600v)
viii. AC Current Meter (Amps)
ix. Load Meter (kW)

d. Alarm Contacts to Telemetry

Provide auxiliary dry contacts for activating remote alarms to the telemetry panel on activation of any of the following conditions:

i. Low Fuel

ii. Generator run

iii. Generator exercise

iv. Generator failure (shutdown)

v. Generator trouble

vi. Generator not in auto

Generator failure alarm shall be activated when any shutdown conditions exists. Generator trouble shall be activated when any alarm conditions exists.

The generator controller shall have an RJ-45 Ethernet port for communicating with the facility control system via Ethernet communications. The controller shall communicate with the control system via EtherNet/IP or Modbus TCP/IP communications protocol.

Generator Controller Exerciser

Generator controller shall be able to set the day, time, and duration of generator set exercise/test period. Provide "With" or "Without" load selector switch for the exercise period. The exerciser clock shall have the capability to program two separate exercises. The Contractor shall program the exerciser clock with the following programs:

Exercise the generator, without load, every Monday for 30 minutes starting at 10 A.M. and ending at 10:30 P.M. with the exception of every fourth Wednesday.

N. Switch Gear

1. Provide generator switch gear with exciter circuit breaker with manual reset and a line circuit breaker with manual reset. Circuit breaker shall be set mounted and wired, UL listed, type as shown on plans, and rated as shown on plans. Circuit breaker shall have ground fault protection. Mount breakers in engine control panel. Field circuit breakers shall not be acceptable for generator overcurrent protection. Generator instrumentation shall include a panel-type ammeter with phase selector switch, a panel-type voltmeter with selector switch, and frequency meter mounted on engine control panel.

O. Battery Charger

1. Provide a battery charger for mounting inside the generator enclosure. The battery charger shall be current-limited, automatic-equalizing and float-charging type. The unit shall comply with UL508 and include the following features:

2. Operation: Equalizing-charging rate of 5A is initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit then automatically switches to a lower float-charging mode and continues operating is that mode until battery is discharged again.

3. Automatic Temperature Compensation: Adjusts floats and equalizes voltages for variations in ambient temperature to prevent overcharging at high temperatures and undercharging at low temperatures.
4. Automatic Voltage Regulation: Maintains output voltage constant regardless of input voltage variations up to plus or minus 10 percent.
5. Ammeter and Voltmeter: Flush mounted in door of battery charger. Meters shall indicate charging rates.
6. Safety Features: Include sensing of abnormally low battery voltages arranged to close contacts providing low battery voltage indication on control and monitoring panel. Also include sensing of high battery voltage and loss of AC input or dc output of battery charger. Either of these conditions closes contacts that provide a battery charger malfunction indication at the monitoring panel.

P. Permanent Outdoor Radiator Mount Load Bank

1. Standards

   The equipment covered by this specification shall be designed with the latest applicable NEMA, NEC, and ANSI standards.

   The load bank shall be listed to UL Standard 508A or labeled by an NRTL acceptable the AHJ per the State of Oregon and local jurisdiction.

2. Products

   The load bank shall be manufactured by a firm regularly engaged in the manufacture of load banks and who can demonstrate at least twenty five (25) years experience with at least twenty five (25) installations of load banks similar or equal to the ones specified herein.

   The load bank shall be an integral component, and supplied with, the generator enclosure. See section I of this specification for enclosure information.

3. Ratings

   The total capacity of the load bank shall be rated 50% of the genset output per Phase at unity Power Factor. The load step resolution shall be a nominal 20% of the load bank rating. The load bank shall be designed for continuous duty cycle operation with no limitations. The load bank shall operate in an ambient temperature of -28°C to 49°C (-20°F to 120°F).

4. Material and Construction

   The load bank shall be suitable for installation on the generator radiator core, or within the radiator exhaust ductwork.

   The main input load bus, load step relays, fuses and blower/control relays shall be located within the load bank enclosure. Airflow openings shall be designed to prevent objects greater than 0.50" diameter from entering the unit.

   The load bank shall be outdoor weatherproof construction. All exterior fasteners shall be stainless steel.

5. Resistive Load Elements

   Load elements shall be helically wound chromium alloy rated to operate at approximately ½ of maximum continuous rating of wire. Elements must be fully supported across the entire length within the air stream by segmented ceramic insulators on stainless steel rods. Load elements shall be removable. The overall tolerance of the load bank shall be –0% to +5% KW at rated voltage.

6. Control Panel

   The control panel shall be mounted within the overall generator enclosure.

   The control panel shall contain the following manual controls:

   a. Power ON/OFF switch

   b. Master load ON/OFF switch.

   c. Load step switches for ON/OFF application of individual load steps.

   Control panel visual indicators shall be as follows:

   a. Power ON indication light.

   b. OVER-TEMPERATURE light.

   Control panel preset for adjustable single-step loading of generator during automatic exercising. A standard remote load dump circuit shall be provided as part of the load bank control circuit. Provisions shall be provided to remove the load bank off-line from the operation of a remote normally closed set of auxiliary contacts from a transfer switch or other device. In the event of the remote contact opening, all load is removed. The generator shall be pre-wired to load dump the load bank when not in exercise mode. The load bank shall operate automatically when in exercise mode. All wiring shall be factory installed and tested.

   An integral control power transformer shall be provided to supply 120V, 1 phase, 60 Hz to the load banks control and motor starter circuitry. Transformer primary and secondary control circuits shall be fuse protected.

Finishes

A. Prime and paint diesel engine set and accessories in conformity with manufacturer's standard practice.

B. Color of diesel engine set enclosure shall be of manufacturer's standard color, unless noted otherwise on Plans.

C. Manufacturer shall ship with the unit a quart of touch-up paint for each of the finishes.

D. All sheet metal exposed to the exterior (generator enclosure) shall be primed for corrosion protection and finish painted with the manufacturer's 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:

   1. Primer thickness, 0.5-2.0 mils. Top coat thickness, 0.8-1.2 mils.

2. Gloss, per ASTM D523-89, 80% plus or minus 5%. Gloss retention after one year shall exceed 50%.
3. Crosshatch adhesion, per ASTM D3359-93, 4B-5B.
4. Impact resistance, per ASTM D2794-93, 120-160 inch-pounds.
5. Salt Spray, per ASTM B117-90, 1000+ hours.
6. Humidity, per ASTM D2247-92, 1000+ hours.
7. Water Soak, per ASTM D2247-92, 1000+ hours.

E. 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.

Source Quality Control

A. Engine generator unit shall be tested at manufacturer's plant at full load before shipment. Test shall consist of a steady load run of at least 8 hours duration at 100 percent full rated load. Complete test reports shall be made which show the engine fuel consumption, kilowatt output, voltage, frequency, amperage, engine temperature, lube oil pressure, and load transfer results. Five (5) copies of the certified test reports shall be supplied to Owner prior to shipment. Engineer, Owner, and/or their representative shall be given opportunity to witness the tests by the manufacturer and inspect the generator at the manufacturer's facility prior to shipment to the jobsite. Notify Engineer and Owner a minimum of 30 days prior to the testing date.

Part 3 - Execution

Installation

A. Install engine in conformity with the plans and manufacturer's instructions and under manufacturer's direct supervision.

B. Install ancillary circuits for battery charger, engine heaters, etc. in conformance with the plans.

Site Test

A. Contractor shall provide sufficient fuel for engine generator on-site testing; following completion of testing Contractor shall fill engine generator fuel tank full prior to project acceptance. Supplier shall be responsible for calibration, startup, and initial performance to meet the specifications herein. Supplier shall provide a trained, qualified representative to check installation and connection, perform field tests as indicated, and certify to Owner its performance does meet the specifications.

B. Upon completion of unit installation, carry out running tests. Operate engine for a period of not less than 8 hours at full rated load. A load bank shall be provided by the Contractor for performing the 8-hour load test. Following load testing, five loss-of-power tests must be performed to verify proper operation of ATS and generator with power being supplied to motor(s) and pump(s). Engine generator shall be tested to verify that the transient

voltage dip will not exceed 15 percent of rated voltage when the largest single step of the rated load is applied. Test shall demonstrate the ability of the engine generator to carry the specified loads. Upon completion of the tests, final adjustments shall be made to equipment by a qualified representative of the engine manufacturer. Fuel and oil filters shall be replaced, belt drive tensions checked, and the proper operation of all equipment demonstrated to Owner's representative. Owner's representative shall be instructed in the maintenance and operation of equipment. Five (5) copies of these test results shall be provided to Owner and included with the operation and instruction manual.

C. Following completion of the generator site test the fuel tank shall be filled prior to project acceptance.

Reservoir Hill

Design Criteria

Provide one self-contained, exterior rated standby engine generator system to automatically operate the load criteria listed in the rating section of these specifications during prime power failure conditions.

Insulate, enclose, or guard exposed parts subject to high-operating temperatures or energized electrically, and moving parts which are of such nature or so located as to be a hazard to operating personnel. Safety devices and safety measures shall not impair the proper functioning of any part of the set.

Parts which require adjustment or servicing (not repair or replacement) to permit operation of the sets shall be arranged to provide optimum ease of servicing. Adjustment, repair, and replacement of parts, assemblies, and accessories shall be possible with minimum drainage and minimum disturbance of set. Maintenance shall be possible by use of common tools.

Design, construct, and install complete engine generator set to be free from objectionable vibration in any mode. Freedom from torsional vibration shall be demonstrated during factory test performed on the set provided, and proof of torsional acceptability shall be provided by the manufacturer.

Performance Criteria

The engine generator set provided shall not have a standby rating less than 35kW at 0.8 PF with fan. Rating of diesel engine-generator set shall be based on operation of set when equipped with all necessary operating accessories such as radiator, fan, air cleaners, lubricating oil pump, fuel injection pump, jacket water pump, and governor charging generator.

Generator shall meet the following requirements:

1. Standby rating – 35 Kilowatt
2. Voltage – 120/240 volts
3. Phase – 1-phase
4. Frequency – 60 Hertz
5. Insulation – Class H
6. Wiring – 12 lead reconnectable

7. Ambient Temperature – 115 degrees Fahrenheit (max), -20 degrees Fahrenheit (min)

Allowable temperature rise in the generator shall not exceed 257 degrees Fahrenheit over 115 degrees Fahrenheit ambient temperature.

The alternator shall produce a clean AC voltage waveform, with not more than 5 percent total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3 percent in any single harmonic, and no 3rd order harmonics or their multiples. Telephone influence factor shall be less than 40.

The generator set shall accept a single step load of 100 percent of rated load at 0.8 power factor and recover to rated speed and voltage as required in NFPA 110.

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.

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 percent.

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.

The generator specified for this project was sized using Cummins PowerSuite software. Due to variations by generator manufacturers and the software used by manufacturers for determining the size of a generator, it is the Contractor's and generator supplier's responsibility to verify the size of the generator to ensure that the generator will perform as specified. All sizing reports shall be submitted by the Contractor and approved by the Owner prior to equipment order. If the supplier/Contractor prepared sizing report requires a larger generator than what is specified, the larger generator shall be provided at no additional cost to the Owner. Refer to the table below for load step information and the Plans for additional electrical load details.

Load Step	***Load Description***
1.	Radio Room – 9.22 kW
2.	Douglas Fast Net Tower Panel – 9.22 kW
3.	Communications Building – 2.4 kW

Submittals

The following information shall be furnished:

1. Evaluation of engine generator size based in starting requirements. Provide calculations verifying transient voltage dip will not exceed 15 percent with sudden application of rated load.
2. Plan of diesel generator set offered showing interconnecting wiring diagrams; all wiring in unit and on Plans shall be number coded.

3. Literature describing the diesel engine generator set.
4. Literature describing auxiliary equipment to be furnished.

The following shall be furnished in tabular form:

1. Engine make
2. Number of cylinders
3. Bore (in inches)
4. Stroke (in inches)
5. Generator make and type
6. Generator electrical rating, kVA
7. Cubic inch displacement Fuel oil consumption
8. Exciter and type
9. Horsepower at rated load
10. Enclosure size, exterior dimensions

Provide factory test results. See Source Quality Control below.

1. Provide field test results. See Site Test requirements under Part 3 of this specification.
2. Provide five (5) copies of manufacturer's operating and maintenance instructions for each piece of equipment. Information shall be complete and in suitable form for ready use by Owner's operations staff. Catalog cuts and information regarding spare parts shall be included. Operating manuals and instructions shall be assembled in hardback binders.

Project Conditions

Interruption of existing electrical service: Do not interrupt electrical service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify Owner no fewer than two working days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner's written permission.
3. Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
    a. Minimum Temperature: 0 degrees Fahrenheit
    b. Maximum Temperature: 115 degrees Fahrenheit.
    c. Relative Humidity: 0-95 percent
    d. Altitude: Sea level to 1200 feet

Coordination

Coordinate size and location of concrete bases for package engine generator set and fuel tanks. Cast anchor-bolt inserts into concrete bases. Concrete, reinforcement and formwork requirements are specified with concrete.

Quality Assurance

The engine generator set shall be supplied by a manufacturer who has been regularly engaged in the production of engine-generators sets and associated controls for a minimum of twenty years, thereby identifying one source of supply and responsibility. The packaged engine generator set, and auxiliary components shall be provided through one source from a single manufacturer.

The manufacturer shall provide factory-trained service and parts support through a factory authorized dealer/supplier that is regularly doing business in the area of installation. The factory authorized dealer/supplier shall maintain a service center capable of providing training, parts, and emergency services within 200 miles of the project site.

Warranty

The electrical standby system, including the engine generator set, exerciser and transfer switch, shall be guaranteed for two years or 1,500 hours operation from date of start-up service and acceptance, whichever occurs first.

Extra Materials

A set of specialty tools necessary for routine maintenance of the equipment shall be furnished.

The following spare parts shall be furnished:

3 - Sets of fuel filter elements and gaskets

3 - Lubricating oil filter elements and gaskets

3 - Air cleaner filter elements

2 - Complete sets of V-belts including fan and alternator drive belts

Part 2 – Products

Manufacturers

Subject to compliance with these specifications, the following manufacturers are approved for bidding:

- Cummins
- Caterpillar
- Kohler
- MTU

Manufactured Units

The general design of the engine generator furnished shall be manufacturer's standard, except where it differs from the requirements of these specifications. Engine shall, as a minimum, be in accordance with requirements of this specification and may be manufacturer's standard commercial product with added features needed to comply with these requirements. Additional or better features which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial products, shall be included in the engine generator being furnished. A standard commercial product is a product which has been or will be sold on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

Components

Generator

1. Generator shall be a revolving field, 4-pole brushless connection to the alternator. Generator rotor shall have been dynamically balanced and aligned with the engine and connected to the engine using a flexible disc coupling.

Voltage Regulator

1. Engine-generator unit shall have a steady state voltage regulator. Generator set shall be capable of recovering to a minimum of 90 percent 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 15 percent.
2. Supply generator with a voltage level control to provide an adjustable output voltage of plus/minus five percent. Mount voltage control device on engine control panel.

Electric Starting System

1. Engine shall be equipped with electric starting system of sufficient capacity to crank engine at a speed which will allow for full diesel start of the engine. Arrange starting pinion to disengage automatically when diesel engine starts.
2. Furnish storage batteries with rack having sufficient capacity for cranking engine for at least 30 seconds at firing speed in ambient temperatures specified and with capacity for starting diesel engine a minimum of three times in immediate succession. Batteries and rack shall be easily removable without disassembly of engine components.

Cooling System

1. Cooling system shall consist of frame-mounted radiator with engine water pump fan assembly and fan guard. Radiator capacity shall be adequate using engine fan cooling to maintain safe operation at 115-degree Fahrenheit ambient temperature.
2. Provide an engine thermostat to regulate engine water temperature as recommended by the manufacturer. Included in the cooling loop shall be a high-coolant temperature device to shut down engine through the engine control panel when engine temperature is excessive.

3. Provide cooling system water heaters suitable for operation on a 120-volt, 60 Hz current to maintain engine water temperature at 120 degrees Fahrenheit at an ambient temperature of 50 degrees Fahrenheit. Heaters shall be Kim jacket heaters or approved equal. Provide thermostatically controlled heaters. The coolant heater shall be UL 499 listed and labeled. Fill engine cooling system with a mixture of water, anti-freeze, and corrosion inhibitor to provide freezing protection at an ambient temperature of -20 degrees Fahrenheit.

Air Cleaners

1. Engine shall be provided with one or more dry-type air cleaners of sufficient capacity to effectively protect working parts of the engine from dust, grit, and ash.

Governor System

1. An electronic governor system shall provide automatic isochronous frequency regulation. 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 cool down at idle function.

Lubrication

1. Engine shall have gear-type lubricating oil pump for supplying oil under pressure to main bearings, crank pin bearings, pistons, piston pins, timing gears, camshaft bearings, and valve rocker mechanism.
2. Provide effective lubricating oil filter and locate and connect it so that lubricating oil is continuously filtered and cleaned. Filters shall be accessible, easily removed and cleaned, and equipped with spring-loaded bypass valve as insurance against stoppage of lubricating oil circulation in event the filters become clogged.
3. Engine shall have suitable lubricating oil cooler, either air-cooled or water-cooled, and provisions for draining oil by piping or other means to the outside of engine housing.

Frame

1. Engine shall be factory-assembled and aligned on a heavy-duty steel base with integral fuel tank. Batteries shall be housed in an acid-resistant box, which shall be mounted on engine frame and adjacent to the engine. Location of battery housing shall not interfere with maintenance and inspection of the engine. Construct the frame to insure proper alignment of all rotating parts and to prevent vibration build-up. Base shall permit skidding in any direction during installation and shall be provided with suitable holes for foundation bolts and vibration isolators. Provide vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer. Isolators shall include seismic restraints if required by the site location.
2. Set shall have provision for conveniently attaching hoisting slings as well as for fork lift pick-up.

Sound-Attenuated Enclosure

1. The engine/generator system shall be provided with an exterior rated, sound-attenuated enclosure to reduce noise emissions, protect the system from excessive dirt, dust, ash, weather and vandalism. All access doors shall be lockable. The housing shall be factory

installed and allow easy access to the engine-generator and the control panel. The control panel shall be mounted on the end of the enclosure, opposite the radiator end. Enclosure doors shall not be wider than 36-inch each to allow for convenient access to the enclosure interior.

2. The enclosure shall provide a sound level at full load no greater than 75 dB(A). This sound level shall represent the average measurement taken at eight points located equidistant, 23 feet from the center of the engine generator at full load.
3. The enclosure shall comply with the requirements of the NEC 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 100 degrees Fahrenheit. The housing shall have hinged access doors as required to maintain easy access for all operating and service functions. 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. 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.
5. 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.
6. The enclosure shall include the following maintenance provisions:
    a) Flexible coolant and lubricating oil drain lines, that extend to the exterior of the enclosure, with internal drain valves.
    b) External radiator fill provision.

Exhaust System

1. Muffler shall be rated as necessary to comply with City of Roseburg noise emission standards, and shall be furnished with the engine. The muffler and engine combination shall be sized to meet the power supply rating.
2. All exhaust piping and fittings shall be stainless steel. Provide stainless steel supports as necessary for a secure rigid pipe system.
3. Exhaust system for the diesel engine shall conform to codes set forth in the NFPA, Volume 4, Section 211, and shall comply with recommendations for exhaust systems as specified by the diesel engine manufacturer.
4. Pitch horizontal runs of exhaust pipe downward, away from engine. Completely support the exhaust system so no weight or stress is applied to engine exhaust manifold or turbocharger.
5. Provide a condensate drain for the muffler through a petcock.

6. The entire exhaust system shall be wrapped in an insulation blanket rated to withstand a minimum temperature of 1,200 degrees Fahrenheit. The exterior blanket shall be protected with a 0.016 aluminum jacket with weatherproof end cap.

Fuel System

1. Engine shall operate on automotive diesel fuel complying with the limiting requirements of ASTM grade low sulfur Diesel Fuel #2 and the requirements of the engine manufacturer. Diesel engines requiring a premium fuel will not be considered.
2. Injection pumps and injection valves shall be a type not requiring adjustment in service and shall be capable of quick replacement by ordinary mechanics without special diesel experience.
3. Fuel injection pumps shall be positive action, constant-stroke pumps, actuated by cam-driven gears from engine camshaft.
4. Fuel lines between injection pumps and valves shall be of heavy seamless tubing and, to eliminate irregularity of fuel injection shall be the same length for all cylinders.
5. Equip fuel system with racor-type, water-removing fuel filter, having replaceable elements which may be easily removed from their housing for replacing, without breaking any fuel line connections or disturbing fuel pumps or any other part of engine. Locate all fuel filters in one accessible housing, ahead of injection pumps so that fuel will have been thoroughly filtered before it reaches the pump. No screen or filter requiring cleaning or replacement will be used in the injection pump or injection valve assemblies.
6. Provide integral fuel tank mounted between the structural steel skids for engine fuel supply. The tank, as installed shall meet all local and regional requirements for above ground tanks. The tank shall be sized to allow 72 hours of continuous full load operation using the following criteria:
   a) 48 hours of exercising supply before low fuel alarm
   b) 24 hours of operation after a low-low fuel alarm
7. Tank shall be especially constructed for mounting in this location by the engine generator manufacturer. Provide tank with the following:
   a) Fuel level gauge
   b) Drain
   c) Fill pipe and vent
   d) Leak detection provisions, wired to the generator set control for local and remote alarm indication.
   e) High- and low-level float switches to indicate fuel level. Wire switches to generator control for local and remote indication of fuel level.
   f) Integral lifting provisions.
   g) Slope tanks to the engine pick-up tube 5 percent minimum. Provide a panel mounted fuel level gauge.

8. Provide fuel feed line valve at engine. Provide fuel return line that is not valved. Mount return line in the top of the tank to prevent fuel siphon into the engine. All fuel lines shall have flexible sections between tank and engine to absorb vibration.
9. Install fuel storage system according to diesel engine manufacturer's recommendations and conform to the NFPA Code and Uniform Building Code.

Fuel

1. Fill fuel tank completely full at completion of construction.

Control Panel and Alarm System

1. The Engine control panel shall be integrally mounted to the engine generator assembly on the generator at the opposite end of the radiator. It shall be enclosed in a NEMA 4 enclosure.
2. The control shall have automatic remote start capability from a panel-mounted, 3-position (Stop, Run, and Remote) switch.
3. The generator set shall be provided with alarm and status indicating lamps to indicate non-automatic generator status, and existing alarm and shutdown conditions. The lamps shall be high-intensity LED type.
4. Alarm panel shall have a reset push button for acknowledging alarm conditions and latching indicating lights for each alarm point to display to operation personnel the reason for engine shutdown. Label lights as shown below.
5. The generator set control shall indicate the existence of the following alarm and shutdown conditions on a digital display panel:
    a. Alarms
        i. Low oil pressure warning
        ii. Oil pressure sender failure
        iii. Low coolant temperature
        iv. High coolant temperature warning
        v. Low coolant level
        vi. Engine temperature sender failure
        vii. Low DC voltage
        viii. High DC voltage
        ix. Weak battery
        x. Low fuel warning
        xi. Overload
        xii. Battery Charger Malfunction
        xiii. Overcurrent
        xiv. Under Frequency

b. Shutdown Alarms

i. Low oil pressure

ii. Low-Low Fuel

iii. High coolant temperature

iv. Fail to crank

v. Overcrank

vi. Overspeed

vii. High AC voltage

viii. Low AC voltage

ix. Under frequency

x. Over current

xi. Short circuit

xii. Emergency stop

c. Engine control panel shall include the following:

i. Oil pressure gauge (psi)

ii. Emergency Stop Pushbutton

iii. Coolant temperature gauge (°F)

iv. Operating hour meter (hrs)

v. Hand-off Auto Selector switch (HOA)

vi. AC Frequency meter (hertz)

vii. AC Volt meter (0-600v)

viii. AC Current Meter (Amps)

ix. Load Meter (kW)

d. Alarm Contacts to Telemetry

Provide auxiliary dry contacts for activating remote alarms to the telemetry panel on activation of any of the following conditions:

i. Low Fuel

ii. Generator run

iii. Generator failure (shutdown)

iv. Generator trouble

v. Fuel leak

vi. Generator Not in Auto

Generator failure alarm shall be activated when any shutdown conditions exists. Generator trouble shall be activated when any alarm conditions exists.

Switch Gear

1. Provide generator switch gear with exciter circuit breaker with manual reset and a line circuit breaker with manual reset. Circuit breaker shall be set mounted and wired, UL listed, molded case thermal-magnetic type, rated as shown on Plans. Mount breakers in engine control panel. Field circuit breakers shall not be acceptable for generator overcurrent protection. Generator instrumentation shall include a panel-type ammeter with phase selector switch, a panel-type voltmeter with selector switch, and frequency meter mounted on engine control panel.

Battery Charger

1. Provide a battery charger inside of the generator enclosure. The battery charger shall be current-limited, automatic-equalizing and float-charging type. The unit shall comply with UL508 and include the following features:
2. Operation: Equalizing-charging rate of 5A is initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit then automatically switches to a lower float-charging mode and continues operating is that mode until battery is discharged again.
3. Automatic Temperature Compensation: Adjusts floats and equalizes voltages for variations in ambient temperature to prevent overcharging at high temperatures and undercharging at low temperatures.
4. Automatic Voltage Regulation: Maintains output voltage constant regardless of input voltage variations up to plus or minus 10 percent.
5. Ammeter and Voltmeter: Flush mounted in door of battery charger. Meters shall indicate charging rates.
6. Safety Features: Include sensing of abnormally low battery voltages arranged to close contacts providing low battery voltage indication on control and monitoring panel. Also include sensing of high battery voltage and loss of AC input or DC output of battery charger. Either of these conditions closes contacts that provide a battery charger malfunction indication at the monitoring panel.

Finishes

Prime and paint diesel engine set and accessories in conformity with manufacturer's standard practice.

Color of diesel engine set enclosure shall be of manufacturer's standard color, unless noted otherwise on Plans.

Manufacturer shall ship with the unit a quart of touch-up paint for each of the finishes.

All sheet metal exposed to the exterior (generator enclosure) shall be primed for corrosion protection and finish painted with the manufacturer's 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:

1. Primer thickness, 0.5-2.0 Mils. Top coat thickness, 0.8-1.2 Mils.
2. Gloss, per ASTM D523-89, 80-percent plus or minus 5-percent. Gloss retention after one year shall exceed 50 percent.
3. Crosshatch adhesion, per ASTM D3359-93, 4B-5B.
4. Impact resistance, per ASTM D2794-93, 120-160 inch-pounds.
5. Salt Spray, per ASTM B117-90, 1000+ hours.
6. Humidity, per ASTM D2247-92, 1000+ hours.
7. Water Soak, per ASTM D2247-92, 1000+ hours.

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.

Source Quality Control

Engine generator unit shall be tested at manufacturer's plant at full load before shipment. Test shall consist of a steady load run of at least 4 hours duration at 100 percent full rated load. Complete test reports shall be made which show the engine fuel consumption, kilowatt output, voltage, frequency, amperage, engine temperature, lube oil pressure, and load transfer results. Five (5) copies of the certified test reports shall be supplied to Owner prior to shipment. Engineer, Owner, and/or their representative shall be given opportunity to witness the tests by the manufacturer and inspect the generator at the manufacturer's facility prior to shipment to the jobsite. Notify Engineer and Owner a minimum of 30 days prior to the testing date.

Part 3 - Execution

Installation

Install engine in conformity with the Plans and manufacturer's instructions and under manufacturer's direct supervision.

Install ancillary circuits for battery charger, engine heaters, etc. in conformance with the Plans.

Site Test

Contractor shall provide sufficient fuel for engine generator on-site testing; following completion of testing Contractor shall fill engine generator fuel tank full prior to project acceptance. Supplier shall be responsible for calibration, startup, and initial performance to meet the specifications herein. Supplier shall provide a trained, qualified representative to check installation and connection, perform field tests as indicated, and certify to Owner its performance does meet the specifications.

Upon completion of unit installation, carry out running tests. Operate engine for a period of not less than 2 hours at full rated load. A load bank shall be provided by the Contractor for performing the 2-hour load test. Following load testing, five loss-of-power tests must be performed to verify proper operation of ATS and generator with power being supplied to

motor(s) and pump(s). Engine generator shall be tested to verify that the transient voltage dip will not exceed 15 percent of rated voltage when the largest single step of the rated load is applied. Test shall demonstrate the ability of the engine generator to carry the specified loads. Upon completion of the tests, final adjustments shall be made to equipment by a qualified representative of the engine manufacturer. Fuel and oil filters shall be replaced, belt drive tensions checked, and the proper operation of all equipment demonstrated to Owner's representative. Owner's representative shall be instructed in the maintenance and operation of equipment. Five (5) copies of these test results shall be provided to Owner and included with the operation and instruction manual.

16.91.3 Portable Diesel Engine Generator Sets

Part 1 – General

Design Criteria

Provide **two** self-contained, exterior rated, trailer-mounted standby engine generator system to operate the load criteria listed in the rating section of these specifications during prime power failure conditions. The supplier of the portable engine generator shall be responsible for obtaining the necessary permits including environmental requirements of National, State and local environmental regulatory agencies in order to operate the portable generator in the State of Oregon and be conveyed on public thoroughfares.

Insulate, enclose, or guard exposed parts subject to high-operating temperatures or energized electrically, and moving parts which are of such nature or so located as to be a hazard to operating personnel. Safety devices and safety measures shall not impair the proper functioning of any part of the set.

Parts which require adjustment or servicing (not repair or replacement) to permit operation of the sets shall be arranged to provide optimum ease of servicing. Adjustment, repair, and replacement of parts, assemblies, and accessories shall be possible with minimum drainage and minimum disturbance of set. Maintenance shall be possible by use of common tools.

Design, construct, and install complete engine generator set to be free from objectionable vibration in any mode. Freedom from torsional vibration shall be demonstrated during factory test performed on the set provided, and proof of torsional acceptability shall be provided by the manufacturer.

Performance Criteria

The engine generator set provided shall not have a standby rating less than 150 kW at 0.8 PF with fan. Rating of diesel engine-generator set shall be based on operation of set when equipped with all necessary operating accessories such as radiator, fan, air cleaners, lubricating oil pump, fuel injection pump, jacket water pump, and governor charging generator.

Generator shall meet the following requirements:

- Standby rating – 150 Kilowatt
- Voltage – Adjustable. 277/480 volts, 120/208 Volts
- Phase – 3 phase

- Frequency – 60 Hertz
- Insulation – Class H
- Wiring – 12 lead reconnectable
- Ambient Temperature – 115 degrees F (max), -20 degrees F (min)

Allowable temperature rise in the generator shall not exceed 257 degrees F over 104 degrees F ambient temperature.

The alternator shall produce a clean AC voltage waveform, with not more than 5 percent total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3 percent in any single harmonic, and no 3rd order harmonics or their multiples. Telephone influence factor shall be less than 40.

The generator set shall accept a single step load of 100 percent of rated load at 0.8 power factor and recover to rated speed and voltage as required in NFPA 110.

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.

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 percent.

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.

Submittals

The following information shall be furnished:

Evaluation of engine generator size based in starting requirements. Provide calculations verifying transient voltage dip will not exceed 15 percent with sudden application of rated load. Refer to Plans for electrical load details.

Plan of diesel generator set offered showing interconnecting wiring diagrams; all wiring in unit and on Plans shall be number coded.

Literature describing the diesel engine generator set.

Literature describing auxiliary equipment to be furnished.

The following shall be furnished in tabular form:

- Engine make
- Number of cylinders
- Bore (in inches)
- Stroke (in inches)
- Generator make and type
- Generator electrical rating, kVA

- Cubic inch displacement Fuel oil consumption
- Exciter and type
- Horsepower at rated load
- Enclosure size, exterior dimensions
- Trailer size, exterior dimensions

Provide factory test results. See Source Quality Control below.

Provide field test results. See Site Test requirements under Part 3 of this specification.

Provide five (5) copies of manufacturer's operating and maintenance instructions for each piece of equipment. Information shall be complete and in suitable form for ready use by Owner's operations staff. Catalog cuts and information regarding spare parts shall be included. Operating manuals and instructions shall be assembled in hardback binders.

Project Conditions

Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

- Ambient Temperature: 10 degrees Fahrenheit to plus 115 degrees F.
- Altitude: Sea level to 1,200 feet

Warranty

The electrical standby system, including the engine generator set, exerciser and transfer switch, shall be guaranteed for 2 years or 1,500 hours operation from date of start-up service and acceptance, whichever occurs first.

Extra Materials

A set of specialty tools necessary for routine maintenance of the equipment shall be furnished.

The following spare parts shall be furnished for each generator:

3 - Sets of fuel filter elements and gaskets
3 - Lubricating oil filter elements and gaskets
3 - Air cleaner filter elements
2 - Complete sets of V-belts including fan and alternator drive belts

Part 2 – Products

Manufacturers

Subject to compliance with these specifications, the following manufacturers are approved for bidding:

- Cummins
- Caterpillar
- Kohler
- MTU

Ensure engine generator and accessories are provided by the above-named manufacturer and its authorized dealer. Ensure local availability of service and replacement parts.

Manufactured Units

The general design of the engine generator furnished shall be manufacturer's standard, except where it differs from the requirements of these specifications. Engine shall, as a minimum, be in accordance with requirements of this specification and may be manufacturer's standard commercial product with added features needed to comply with these requirements. Additional or better features which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial products, shall be included in the engine generator being furnished. A standard commercial product is a product which has been or will be sold on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

Components

Generator

Generator shall be a revolving field, 4-pole brushless connection to the alternator. Generator rotor shall have been dynamically balanced and aligned with the engine, and connected to the engine using a flexible disc coupling.

Voltage Regulator

Engine-generator unit shall have a steady state voltage regulator. Generator set shall be capable of recovering to a minimum of 90 percent 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 15 percent.

Supply generator with a voltage level control to provide an adjustable output voltage of plus/minus five percent. Mount voltage control device on engine control panel.

Electric Starting System

Engine shall be equipped with electric starting system of sufficient capacity to crank engine at a speed which will allow for full diesel start of the engine. Arrange starting pinion to disengage automatically when diesel engine starts.

Furnish storage batteries with rack having sufficient capacity for cranking engine for at least 30 seconds at firing speed in ambient temperatures specified and with capacity for starting diesel engine a minimum of three times in immediate succession. Batteries for the portable generator shall be housed in a heavy duty mounting rack bolted to the trailer frame. Location of battery housing shall not interfere with maintenance and inspection of the engine.

Cooling System

Cooling system shall consist of frame-mounted radiator with engine water pump fan assembly and fan guard. Radiator capacity shall be adequate using engine fan cooling to maintain safe operation at 105 degrees Fahrenheit ambient temperature.

Provide an engine thermostat to regulate engine water temperature as recommended by the manufacturer. Included in the cooling loop shall be a high-coolant temperature device to shut down engine through the engine control panel when engine temperature is excessive.

Provide cooling system water heaters suitable for operation on a 120-volt, 60 Hz current to maintain engine water temperature at 120 degrees Fahrenheit at an ambient temperature of 50 degrees Fahrenheit. Heaters shall be Kim jacket heaters or approved equal. Provide thermostatically controlled heaters. The coolant heater shall be UL 499 listed and labeled. Fill engine cooling system with a mixture of water, anti-freeze, and corrosion inhibitor to provide freezing protection at an ambient temperature of -20 degrees Fahrenheit.

Provide generator cooling system heater with a (25) foot SO cord with a 20 amp, 2-pole, 3-wire, 125 volt rated male plug connection for supplying power to the proposed coolant heater through a plug-in connection.

Air Cleaners

Engine shall be provided with one or more dry-type air cleaners of sufficient capacity to effectively protect working parts of the engine from dust, grit, and ash.

Governor System

An electronic governor system shall provide automatic isochronous frequency regulation. 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 cool down at idle function.

Lubrication

Engine shall have gear-type lubricating oil pump for supplying oil under pressure to main bearings, crank pin bearings, pistons, piston pins, timing gears, camshaft bearings, and valve rocker mechanism.

Provide effective lubricating oil filter, and locate and connect it so that lubricating oil is continuously filtered and cleaned. Filters shall be accessible, easily removed and cleaned, and equipped with spring-loaded bypass valve as insurance against stoppage of lubricating oil circulation in event the filters become clogged.

Engine shall have suitable lubricating oil cooler, either air-cooled or water-cooled, and provisions for draining oil by piping or other means to the outside of engine housing.

Portable Engine Generator Trailer

The portable engine generator set shall be factory assembled and aligned on a structural steel frame and trailer. The assembly shall be constructed to ensure the proper alignment of all rotating parts during operation and transit. The enclosure shall completely enclose the engine, generator, controls and cooling system, and shall be suitable for outdoor storage without corrosion or equipment deterioration.

The trailer shall have a Gross Vehicle Weight Rating (GVWR) of 125 percent of the total weight of all installed components, including but not limited to, generator/engine assembly plus all fluids, sound-attenuated enclosure, fuel tank, fuel, and accessories plus

100 percent of the weight of the trailer. GVWR shall be at least 125 percent of payload weight plus the curb weight of the trailer. The towing hitch assembly shall be rated for the GVWR of the trailer. The trailer weight distribution shall be such that the trailer has adequate positive tongue weight.

The trailer shall have tandem axles with DOT approved electric brakes and appropriately rated transport tires and rims for the applicable load range. Breakaway lock-up shall be provided so the brakes can be set and locked for unattended operation. Brakes shall be on each wheel. Each axle shall be rated to meet the GVWR requirement specified for this project. Dual wheels and tires on each side of the axle will be acceptable.

The complete engine generator with trailer set shall be street legal and licensable per Department of Transportation (DOT) requirements for operation in the State of Oregon on highways and streets. The complete engine generator set lighting system shall meet ICC and Oregon State licensing requirements. The Supplier shall provide a Manufacturers Statement of Origin (MSO) and a dealer transfer of title form at time of delivery to the Owner for licensing. The Supplier shall supply temporary licensing for transporting engine generator set to the Owner for testing and final delivery.

The maximum allowable travel mileage on the trailer prior to final delivery to the Owner shall be less than 500 miles.

Each trailer shall have the following accessories:

1. Pintle hitch
2. Front retractable dead stand
3. Rear license plate holder
4. Fenders, bumpers with recessed lights, hub caps
5. Two safety chains with grab hooks
6. Four wheel blocks (two for each side of the trailer) for setting when the trailer is parked
7. ICC safety equipment (reflectors, Stop/turn/tail/license lights)
8. Cable storage box with hinged lockable lid
9. Spare wheel, tire and carrier
10. Double rear load leveling jacks
11. Walking platform around EG set suitable for maintenance personnel to access control panel.
12. Exterior flood light (switched) and rotating emergency beacon (24-volt DC)
13. Control panel light (backlight and flood light) (24-volt DC)

The enclosure shall have the following accessories:

1. Exhaust silencer mounting brackets
2. Oil, water and fuel drains outside the housing
3. Fuel filler with locking cap

Outdoor Weather Protective Enclosure

The engine generator systems shall be provided with sound-attenuated enclosures to reduce noise emissions, protect the systems from excessive dirt, dust, ash, weather and vandalism. All access doors shall be provided with metal case cylinder style locks. Provide 4 keys for generator enclosure locks. The housings shall be factory installed and allow easy access to the engine-generators and the control panels. The control panel shall be mounted on the end of the enclosure, opposite the radiator end. Enclosure doors shall not be wider than 36 inches each to allow for convenient access to the enclosure interior.

The enclosures shall provide a sound level at full load no greater than 75 dB(A). This sound level shall represent the average measurement taken at eight points located equidistant, 23 feet from the center of the engine generators at full load.

The enclosures shall comply with the requirements of the National Electrical Code for all wiring materials and component spacing. Housings shall provide ample airflow for generator set operation at rated load in an ambient temperature of 115 degrees F. The housings shall have hinged access doors as required to maintain easy access for all operating and service functions. 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.

All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's 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:

Primer thickness, 0.5-2.0 mils. Top coat thickness, 0.8-1.2 mils.

Gloss, per ASTM D523-89, 80% plus or minus 5 percent. Gloss retention after one year shall exceed 50 percent.

Crosshatch adhesion, per ASTM D3359-93, 4B-5B.

Impact resistance, per ASTM D2794-93, 120-160 inch-pounds.

Salt Spray, per ASTM B117-90, 1000+ hours.

Humidity, per ASTM D2247-92, 1000+ hours.

Water Soak, per ASTM D2247-92, 1000+ hours.

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.

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.

A factory-mounted exhaust silencer shall be installed inside the enclosures. The exhaust shall exit the enclosures through a rain collar and terminate with a rain cap. Exhaust connections to the generator sets shall be through seamless flexible connections.

The enclosure shall include the following maintenance provisions:

1. Flexible coolant and lubricating oil drain lines that extend to the exterior of the enclosure, with internal drain valves.
2. External radiator fill provision.

Exhaust System

Muffler shall be rated as necessary to comply with City of Roseburg and Oregon State noise emission standards, and shall be furnished with the engine. The muffler and engine combination shall be sized to meet the power supply rating.

All exhaust piping, including silencer, and fittings shall be stainless steel. Provide stainless steel supports as necessary for a secure rigid pipe system.

Exhaust system for the diesel engine shall conform to codes set forth in the National Fire Protection Association, Volume 4, Section 211, and shall comply with recommendations for exhaust systems as specified by the diesel engine manufacturer.

Pitch horizontal runs of exhaust pipe downward, away from engine. Completely support the exhaust system so no weight or stress is applied to engine exhaust manifold or turbocharger.

Provide a condensate drain for the muffler through a petcock.

Fuel System

Engine shall operate on automotive diesel fuel complying with the limiting requirements of ASTM grade low sulfur Diesel Fuel #2 and the requirements of the engine manufacturer. Diesel engines requiring a premium fuel will not be considered.

Injection pumps and injection valves shall be a type not requiring adjustment in service and shall be capable of quick replacement by ordinary mechanics without special diesel experience.

Fuel injection pumps shall be positive action, constant-stroke pumps, actuated by cam-driven gears from engine camshaft.

Fuel lines between injection pumps and valves shall be of heavy seamless tubing and, to eliminate irregularity of fuel injection shall be the same length for all cylinders.

Equip fuel system with racor-type, water-removing fuel filter, having replaceable elements which may be easily removed from their housing for replacing, without breaking any fuel line connections or disturbing fuel pumps or any other part of engine. Locate all fuel filters in one accessible housing, ahead of injection pumps so that fuel will have been thoroughly filtered before it reaches the pump. No screen or filter requiring cleaning or replacement will be used in the injection pump or injection valve assemblies.

Provide portable generator with a dual wall fuel tank mounted to the trailer underneath the engine assembly for engine fuel supply. The portable generator fuel tank shall be baffled to minimize fuel slosh and load transfer during towing, and shall be hydrostatically tested after installation. The tank shall have an integral fuel level gauge, exterior lockable fill connector, exterior rain proof vent, flexibly connected suction and return lines and a drain line routed through the steel base plate.

The tank, as installed shall meet all local and regional requirements for above ground tanks. Tank shall be especially constructed for mounting in these locations by the engine generator manufacturer. Provide tanks with the following:

1. Fuel level gauge
2. Drain
3. Fill pipe and vent. Manufacture shall refer to the structural drawings to insure that the walking platform around the stationary engine generator does not interfere with fill pipe and vent.
4. Leak detection provisions, wired to the generator set control for local and remote alarm indication.
5. High and low level float switches to indicate fuel level. Wire switches to generator control for local and remote indication of fuel level.
6. Slope tanks to the engine pick-up tube 5 percent minimum. Provide a panel mounted fuel level gauge.

Provide fuel feed line valve at engine. Provide fuel return line that is not valved. Mount return line in the top of the tank to prevent fuel siphon into the engine. All fuel lines shall have flexible sections between tank and engine to absorb vibration.

Install fuel storage system according to diesel engine manufacturer's recommendations and conform to the National Fire Protection Code and Uniform Building Code.

Fill fuel tank completely full at completion of construction.

Control Panel and Alarm System

The Engine control panel shall be integrally mounted to the engine generator assembly on the generator at the opposite end of the radiator. It shall be enclosed in a NEMA 4 enclosure.

The control shall have automatic remote start capability from a panel-mounted three-position (Stop, Run, and Remote) switch.

The generator set shall be provided with alarm and status indicating lamps to indicate non-automatic generator status, and existing alarm and shutdown conditions. The lamps shall be high-intensity LED type. The generator set control shall indicate the existence of the following alarm and shutdown conditions on a digital display panel:

Alarms

1. Low oil pressure warning
2. Oil pressure sender failure
3. Low coolant temperature
4. High coolant temperature warning
5. Low coolant level
6. Engine temperature sender failure

7. Low DC voltage
8. High DC voltage
9. Weak battery
10. Low fuel warning
11. Overload
12. Battery Charger Malfunction
13. Overcurrent
14. Under Frequency

Shutdown Alarms

1. Low oil pressure
2. Low-Low Fuel
3. High coolant temperature
4. Fail to crank
5. Overcrank
6. Overspeed
7. High AC voltage
8. Low AC voltage
9. Under frequency
10. Over current
11. Short circuit
12. Emergency stop

Engine control panel shall include the following:

1. Oil pressure gauge (psi)
2. Emergency Stop Pushbutton
3. Coolant temperature gauge (°F)
4. Operating hour meter (hrs)
5. Hand-off Auto Selector switch (H-O-A)
6. AC Frequency meter (hertz)
7. AC Volt meter (0-600v)
8. AC Current Meter (Amps)
9. Load Meter (kW)

Alarm panel shall have a reset push button for acknowledging alarm conditions and latching indicating lights for each alarm point to display to operation personnel the reason for engine shutdown. Label lights as shown above.

Generator Control Connections

The generator shall have a readily-accessible terminal block location for means of connecting a control cable. Terminal blocks for the following signals shall be included:

1. Generator Remote Start
2. Generator Not in Auto Alarm
3. Generator Fail Alarm
4. Generator Low Fuel Alarm
5. Generator Run Status

Switch Gear

Provide generator switch gear with exciter circuit breaker with manual reset and a line circuit breaker with manual reset. Circuit breaker shall be set mounted and wired, UL listed, molded case thermal-magnetic type. Mount breaker in engine control panel. Field circuit breakers shall not be acceptable for generator overcurrent protection. Generator instrumentation shall include a panel-type ammeter with phase selector switch, a panel-type voltmeter with selector switch, and frequency meter mounted on engine control panel.

Battery Charger

Provide generator battery charger mounted to the portable generator with a (25) foot SO cord with a 20 amp, 2-pole, 3-wire, 125 volt rated male plug connection for supplying power to the proposed battery charger through a plug-in connection.

Operation: Equalizing-charging rate of 5A is initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit then automatically switches to a lower float-charging mode and continues operating in that mode until battery is discharged again.

Automatic Temperature Compensation: Adjusts floats and equalizes voltages for variations in ambient temperature to prevent overcharging at high temperatures and undercharging at low temperatures.

Automatic Voltage Regulation: Maintains output voltage constant regardless of input voltage variations up to plus or minus 10 percent.

Ammeter and Voltmeter: Flush mounted in door of battery charger. Meters shall indicate charging rates.

Safety Features: Include sensing of abnormally low battery voltages arranged to close contacts providing low battery voltage indication on control and monitoring panel. Also include sensing of high battery voltage and loss of AC input or dc output of battery charger. Either of these conditions closes contacts that provide a battery charger malfunction indication at the monitoring panel.

120V Convenience Outlet

Provide portable generator with a duplex, 20 amp rated convenience outlet for use by the City when the generator is in operation. Provide circuit breaker, transformer, conduit and wiring to provide the convenience outlet.

EG Mounted Receptacle Cabinet

The proposed portable engine generator shall each be provided with a NEMA 4 stainless steel enclosure with Cam-Style 400 Ampere receptacle; of the same type provided with the Manual Transfer Switch (See ***Section 16.21.6***). Supplier of generator shall coordinate with manual transfer switch supplier to provide compatible system. Receptacles shall be female.

EG Mounted Cable Cabinet and Cables

The proposed portable engine generator shall each be provided with a NEMA 4 stainless steel enclosure to house the generator cables necessary to connect to the Manual Transfer Switch (See ***Section 16.21.6***). The cables shall be rated for the application and for full receptacle amperage. The cables shall be minimum 50' long. Provide (3) sets of cables with generators; one for each generator provided and one spare set of cables.

Source Quality Control

Engine generator unit shall be tested at manufacturer's plant at full load before shipment. Test shall consist of a steady load run of at least 4 hours duration at 100 percent full rated load. Complete test reports shall be made which show the engine fuel consumption, kilowatt output, voltage, frequency, amperage, engine temperature, lube oil pressure, and load transfer results. Five (5) copies of the certified test reports shall be supplied to Owner prior to shipment. Engineer, Owner, and/or their representative shall be given opportunity to witness the tests by the manufacturer and inspect the generator at the manufacturer's facility prior to shipment to the jobsite. Notify Engineer and Owner a minimum of 30 days prior to the testing date.

Part 3 - Execution

Installation

Provide engine generator to Owner's shops. Coordinate delivery schedule, site test and time with Owner.

Install ancillary circuits for battery charger, engine heaters, etc. in conformance with the plans.

Site Test

Supplier shall be responsible for calibration, startup, and initial performance to meet the specifications herein. Supplier shall provide a trained, qualified representative to check installation and connection, perform field tests as indicated, and certify to Owner its performance does meet the specifications.

Upon delivery of units, carry out running tests. Operate each engine for a period of not less than 4 hours, in which five starts of the engine generator set shall be made and power supplied to load bank. Engine generator shall be tested to verify that the transient voltage dip will not exceed 15 percent of rated voltage when sudden application of rated load is applied. Test shall demonstrate the ability of the engine generator to carry the specified loads. Upon completion

of the tests, final adjustments shall be made to equipment by a qualified representative of the engine manufacturer. Fuel and oil filters shall be replaced, belt drive tensions checked, and the proper operation of all equipment demonstrated to Owner's representative. Owner's representative shall be instructed in the maintenance and operation of equipment. Five (5) copies of these test results shall be provided to Owner and included with the operation and instruction manual.

Contractor shall provide load bank for site test. Contractor shall provide fuel for site test.

16.92 Transfer Switches

16.92.2 Automatic Transfer Switch

Part 1 - General

Design Criteria

Winchester Water Treatment Plant: The transfer switch shall be open-frame for installation in the switchboard and equipped with four switched poles for normal and emergency service of 480 volts, 60 hertz, 3-phase. The transfer switch shall be rated for 4,000 Amps.

Reservoir Hill: The transfer switch shall be a 100 Amp, NEMA 3R rated, service entrance rated, and equipped with two switched poles for normal and emergency service of 240 volts, 60 hertz, 1-phase.

The transfer switch shall be mechanically and electrically held and rated to 240 volts (Reservoir Hill) or 480 volts (Winchester Water Treatment Plant) for all classes of load and continuous inductive duty.

The transfer switch shall conform to UL 1008 provisions for Withstand Current Ratings and Closing Ratings. The transfer switch shall be rated at a minimum Withstand Rating of 65,000 Amps (Winchester Water Treatment Plant), 22,000 Amps (Reservoir Hill).

The switch shall be capable of enduring 6,000 cycles of complete opening and closing at rated current and voltage at a rate of 6 cycles per minute without failure.

The switch shall be double throw inherently interlocked mechanically and electrically to prevent supplying the load from both sources simultaneously. The operating current shall be obtained from the source to which the load is to be transferred. The transfer mechanism shall be of the double break design with solid silver cadmium surface contacts and individual heat resistant arc chambers.

Arc barriers and magnetic blowout coils will also be acceptable if single break contacts are used. The contacts shall be capable of carrying 20 times the continuous rating for interrupting current.

All contacts, coils, etc. shall be readily accessible for replacement from front of panel without major disassembly of associated parts.

Part 2 – Products

Manufactured Units

Winchester Water Treatment Plant: The automatic transfer switch shall be supplied by the Manufacturer of the service switchboard.

Reservoir Hill: The automatic transfer switch shall be supplied by the Manufacturer of Engine generator system.

Components

The transfer switch shall include the following accessories:

Undervoltage Sensor

1. Adjustable solid-state low voltage sensing relays (pick up 85 to 98 percent of normal voltage set at 98 percent; drop out 75 to 100 percent set of 90 percent of pickup setting). Provide for each phase on both utility and backup power sources.

Time Delay Start and Stop on Drop Out

1. Solid state adjustable time delay on start (0 to 15 seconds). Set start delay for 15 seconds. Timer will send start signal to gen set CP, where louver timer will allow 15 second delay for louvers to open prior to starting gen set.

Time Delay Stop

1. Solid state adjustable time delay (0 to 10 minutes) to allow generator cooldown after normal power is restored and retransfer occurs. Set at 5 minutes.

Time Delay Transfer and Retransfer

1. Solid state time delay relay adjustable 2 to 120 seconds for transfer to emergency and 0 to 30 minutes for retransfer to normal. Set at 5 minutes for retransfer to normal. Set at 3 seconds for transfer to emergency.

With or Without Load Selector Switch

1. Switch to select exercise with or without facility load.

Normal-Test Switch

1. Switch such that in the "Normal" mode the transfer switch will operate automatically and in the "Test" mode the generator will start for test purposes. This switch shall work in conjunction with the "With" or "Without" load switch.

Exerciser Clock

1. Provide solid state exerciser clock to set the day, time, and duration of generator set exercise/test period. Provide "With" or "Without" load selector switch for the exercise period. The exerciser clock shall have the capability to program two separate exercises. The Contractor shall program the exerciser clock with the following programs:
    a) Exercise the generator, without load, every Monday for 30 minutes starting at 10 A.M. and ending at 10:30 P.M.

Programmed Transition

1. The load transfer control shall be capable of remaining in the neutral position for an adjustable time of 0.5 to 60 seconds when transferring from on-line power source to the other to allow residual voltages to decay before application of the source. Set at 60 seconds.
    a) Position lights for normal and emergency positions indication and for normal and emergency power available.
    b) Switch position indication limit switches for normal and generator positions.
    c) Provide dry contacts wired to terminal strip for 1) ATS in emergency position, 2) ATS common trouble alarm, 3) Normal Position.
    d) Provide contacts and necessary power transformer(s) for supplying power to the EG room intake and exhaust louvers. Contacts shall close once the EG is called to start.

Power Meters

1. Provide an AC Voltmeter, an Ammeter, and a Frequency meter; 2.5-inch, analog, 2-percent accuracy. Provide a phase selector switch to read L-L voltage and current of both power sources.

Operator Interface Display

1. Provide operator interface display that allows operators to adjust all settings and see all values.

Control Board

1. Provide current generation hardware and firmware for the control board.

Provide manual override switch to bypass the control system and transfer load from source to source when control is disabled.

16.93 FUEL TANK SYSTEM

Part 1 - General

Design Criteria

A. Provide an exterior fuel storage tank as shown on the plans for engine fuel supply. The fuel tank shall have a 5,000 gallon capacity. The fuel tank shall be a UL 2085, double walled construction with 6 gauge steel gritblasted (SP6) and coated with (5-8 mils) of paint color as selected by the Owner. Provide color table with at least 10 colors to choose from in fuel tank submittal. The overall dimensions of the tank shall match the Plans.

B. Install fuel storage system according to diesel engine and fuel tank manufacturer's recommendations and conform to the National Fire Protection Code and Uniform Building Code.

C. Provide fuel for testing and fill fuel storage tank completely full at completion of project.

Part 2 – Products

Manufactured Units

A. The fuel tank shall be supplied by Ace Tank and Equipment Company or Equal.

Components

The tank shall be provided with the following equipment and accessories:

A. Fill Access Stairs:
   1. Hot dipped galvanized stair platform as shown on the Plans.

B. Spill Containment (Top Fill):
   1. 7 ½ gallon capacity spill containment box.
   2. Aluminum locking dust cap.
   3. Pipe reducers, bushing, and nipples as necessary.

C. Overfill Prevention System:
   1. Overfill Prevention mechanical valve with tank connection.
   2. Miscellaneous pipe for mounting overfill valve onto tank.

D. Submerged Fill:
   1. Aluminum Drop Tube to 6-inch above tank bottom.

E. Vents:
   1. 8-inch Emergency vent for pressure relief only.
   2. 8-inch Secondary emergency vent.
   3. 3-inch screened pressure / vacuum v style vent. Vent shall discharge 12 feet above finished grade.
   4. 3-inch galvanized vent pipe.

F. Visual Gauge:
   1. Clock gauge with 2-inch tank adapter.
   2. Still well tube, 2-inch to extend to 4-inch off the tank bottom. Field drill a ¼-inch vent hole insuring it is below the top of the primary tank but above the 95 percent shut off level.

G. Manual Gauge:
   1. 2-inch locking cap.
   2. 2-inch x 4-inch black pipe nipple.
   3. 12 feet gauge stick calibrated for 12,000 gallon tanks and reading in inches.
   4. Tank chart converting whole inches to gallons.

H. Level Transducer Gauge:

1. Provide radar level transducer rated for application, with 4-20mA output. Endress+Hauser FMR60 or equal.

I. Supply and Return:

1. Quad tap bushing, 4-inch x 1-inch x 1-inch. Confirm fuel line sizing with generator manufacturer.

J. Anti-Siphon Valve:

1. Solenoid operated Anti-siphon valve. Confirm solenoid voltage with generator manufacturer.

K. Water Drain Valve:

1. 1-inch drain valve with stainless stem.

L. 95 Percent and 90 Percent High Level Alarm Switches:

1. Liquid level switch with 2-inch mount, explosion proof to include junction box; SPDT rated 100W resistive load, 400W maximum at 3 amps; FM approved; Factory set level at 95 percent and 90 percent. Wire Switch to Fuel Tank Monitoring System Control Panel.

M. 10 Percent Low Level Warning Alarm Switch:

1. Liquid level switch with 2-inch mount, explosion proof to include junction box; SPDT rated 100W resistive load, 400W maximum at 3 amps; FM approved; Factory set level at 30 percent. Wire switch to Fuel Tank Monitoring System Control Panel.

N. Containment Monitor Probe Mount:

1. Leak detection switch with Buna-N float and BR stem. Wire switch to Fuel Tank Monitoring System Control Panel.
2. Monitor cap, w/cable connection.
3. Tight fill, brass adapter.
4. Miscellaneous pipe fittings, tank brackets and coating for containment monitor riser pipe.

O. Fuel Tank Monitoring System Control Panel:

1. The fuel tank monitoring system control panel is for both overfill alarm (95 percent and 90 percent), low fuel level (10 percent), and leak monitoring. The control panel shall be bolted to the fill access stairs.
2. Alarm console for 6 alarm functions (95 percent, 90 percent, 10 percent, transition sump leak detection and fuel tank leak detection); Housed in watertight NEMA 4 enclosure; Include audible and visual alarms with reset and test buttons. Connect 10 percent low level and containment monitoring alarm to telemetry.

P. Split Series Transfer Pump and Remote Fuel Dispenser:

1. 2" connection to split series transfer pump for remote fuel dispensing.
2. Transfer pump shall be 120 VAC, 1/3 HP. Mount transfer pump on top of fuel tank.
3. Connect transfer pump to remote fuel dispenser with 1" dia. SS pipe.

4. Provide remote fuel dispenser with 16' of hose and automatic nozzle.

Q. Decals:

1. (2) Industrial Screenprint 312DE, Decal: Diesel, 3-inch x 12-inch, black/white.
2. (1) Industrial Screenprint FSDANGER, Decal: Danger Flammable Liquids, 8-inch x 33-inch, red/white.
3. (2) Industrial Screenprint 312NS, Decal: No Smoking; 3-inch x 12-inch, Red/white.
4. (2) Industrial Screenprint 7.90SV-2, 3-inch x 12-inch, Fill limiter Warning decal.
5. (1) Industrial Screenprint HM020, Hazardous Material decal, diamond shape, 4 color (red, white, blue, yellow) with #s 020 (diesel, kerosene, fuel oil).
6. Industrial Screenprint UMD322, Decal: Touch Here to Discharge Static, 6-inch x 6-inch, Black/Yellow w/Red.
7. Industrial Screenprint UMD322, Decal: In Case of Fire, Do Not Remove Nozzle, Get Away, 6-inch x 6-inch, Black/Yellow w/Red.
8. Industrial Screenprint UMS56, Decal: Prohibit Open Flames and Smoking, 14-inch x 10-inch Metal Sign, Red and Black/White.
9. Industrial Screenprint Decal: Tank Calibration Chart Converting Whole Inches of Fuel to Gallons, 8.5-inch x 11-inch, Laminated.
10. Industrial Screenprint USUMD181, Decal: Dispenser Emergency Shut-off Switch Decal, 7" x 2",Red/White.
11. Industrial Screenprint UMD231, Decal: Dispenser Operating Instructions Decal, 9" x 5", White/Black.
12. Industrial Screenprint UMD225, Decal: Dispenser Emergency Procedures Decal, 13" x 6", Red and Black/White.
13. Industrial Screenprint PD168R12, Decal: Dispenser No Smoking Decal, 3" x 12", Red/White.
14. Industrial Screenprint UMD322, Decal: Use Only Approved Containers, 6" x 6", Black/Yellow w/Red.
15. Industrial Screenprint UMD322, Decal: Never Get Back in the Vehicle During Refueling, 6" x 6", Black/Yellow w/Red.

R. Transition Piping Sump:

1. The transition-piping sump shall be constructed of polyethylene with a polyethylene watertight cover with hold down latches and FRP grate cover. The sump shall include PVC ducting, elbow fitting with a flexible boot on one side and a male adapter fitting on the other, flex couplings for transitioning to flex pipe. The stainless steel pipe and OPW flexworks pipe shall be connected to the transition-piping sump. The complete assembly shall be sealed drip tight and shall be inspected by Owner prior to burial. Fuel line size shall be determined by generator manufacturer. Provide leak detection sensor as shown on Plans.

16.95 Testing

16.95.1 Common Work for Testing

Part 1 - General

Submittals

Test reports shall be submitted to the Engineer prior to final acceptance in accordance with Division 1.33 of these specifications.

Scheduling and Coordination

The Contractor shall inform the Engineer in advance of testing in accordance with the requirements listed in Division 1 of these specifications.

Prior to scheduling the testing, the Contractor shall have satisfied themselves that the project area is properly cleaned up; all patching and painting deemed necessary properly completed; and all systems, equipment and controls are functioning as intended.

Part 2 - Products

Source Quality Control

Submit reports of factory tests and adjustments performed by equipment manufacturers to the Engineer prior to field testing and adjustment of equipment. These reports shall identify the equipment and show dates, results of test, measured values and final adjustment settings. Provide factory tests and adjustments for equipment where factory tests are specified in the equipment specifications. The Engineer may inspect the fabricated equipment at the factory before shipment to job site. Provide the Engineer with sufficient prior notice so that an inspection can be arranged at the factory.

Part 3 – Execution

Site Testing

Test all circuits for continuity, freedom from ground, and proper operation during progress of the work.

Insulation Resistance, Continuity, and Rotation: Perform routine insulation resistance, continuity and rotation tests for all distribution and utilization equipment prior and in addition to tests performed by the testing laboratory specified herein.

Electric Motors: Perform voltage, current and resistance tests on all motors ½ horsepower and larger installed this project. Insulation resistance readings shall be taken with a 500-volt megger for 30 seconds with the circuit conductors connected to the motor. Verify that an overload condition does not exist.

Conduct special test as required for service and/or system ground.

Field Quality Control

General

1. Conduct final test in the presence of Owner and/or their authorized representative. Contractor shall provide all testing instrumentation and labor required to demonstrate satisfactory operation of systems, equipment and controls.

Operational Tests

1. Operational test all circuits to demonstrate that the circuits and equipment have been properly installed, adjusted and are ready for full-time service. Demonstrate the proper functioning of circuits in all modes of operation, and including alarm conditions, and demonstrate satisfactory interfacing with the data acquisition and alarm systems.

16.95.3 Conductor Test Report

Conductor Test Report Page 1 of 1														
PROJECT:								OWNER:						
Contractor Co. Name: Tested by:								Phone Number: Test Date:						
Race-way Label (1)	V (2)	C (3)	Operating Load Voltage						Insulation Resistance - OHMS					
			VAB	VCB	VCA	VAN	VBN	VCN	A-B	B-C	C-A	A-G	B-G	C-G
A														
B														
C														
D														
E														
F														
G														

1. Refer to raceway and wire schedule and one-line diagram for description of feeder identified by label shown on this report
2. Visual Inspection – Check when completed
3. Continuity Test – Check when completed

16.95.4 Ground Electrode Resistance Test Report

Ground Electrode Resistance Test Report	
PROJECT:	OWNER:
Contractor Co. Name: **Tested by**:	Phone Number: Test Date:
Test Meter Type: **Test Distance-D**: **Soil Conditions**: **Measured Resistance**:	
DESCRIPTION OF TEST PROCEDURE, CONDITIONS, RESULTS:	

17.00 GENERAL

This division covers all work necessary for furnishing, installing, adjusting, testing, documenting, and starting-up the Instrumentation and Control (I&C) and Telemetry System. Programmable logic controller (PLC) shall provide local, automatic control. Computer-based telemetry system will provide remote control, alarm presentation, and data logging activities at the Owner's headquarters location.

Sections in these specifications titled "*Common Work for . . .*" shall apply to all following related subsections whether directly referenced or not.

These specifications are an integral part of the contract documents for the I&C and Telemetry portion of this contract. The written descriptions of system performance contained herein are given to assist the Contractor in interpreting the contract plans but are not intended to be all-inclusive. The Contractor shall be aware that all automatic control systems do not require the same components and accessories for complete system operation. Therefore, these specifications do not include all accessories and appurtenances required for a complete system. The Contractor shall, however, provide all accessories and appurtenances to result in a completely operational system as required to meet the functional requirements of these documents. Where specific equipment specifications are given, they are used to represent the level of quality required by these documents.

17.05 Common Work for Automatic Control

Part 1 - General

Summary

The work under this division covers construction specifically described in these specifications. Project Plans will be provided for this project. All work incidental and necessary to the completion of the project described herein shall be completed under the bid item listed in the bid proposal, and no other compensation will be allowed. The work generally consists of the following:

- Detailed system layout and design for the particular equipment bid in accordance with these functional specifications.
- Furnishing of I&C equipment including delivery, storage, software, programming, installation, testing, startup, and documentation.
- Providing operator maintenance manuals for all equipment and devices provided by this Contract.
- Providing system training to the operators of the proposed equipment.

Related Sections

- Division 16 Electrical

References

The project Plans are based on Instrument Society of America (ISA) standards numbers S5.1, S5.2, S5.3, and S5.4. The Contractor is encouraged to be familiar with these standards since the project plans do not contain wiring or ladder diagrams, but are based on the functional requirements of the ISA format.

All equipment and materials shall conform to the latest revised editions of applicable standards published by the following organizations:

- American National Standards Institute (ANSI).
- Institute of Electrical and Electronic Engineers (IEEE).
- National Electrical Manufacturers Association (NEMA).
- Underwriters' Laboratories (U/L).
- Instrument Society of America (ISA)

All equipment and materials, and the design, construction, installation, and application thereof shall comply with all applicable provisions of the National Electrical Code (NEC), the Occupational Safety and Health Act (OSHA), and any applicable Federal, State, and local ordinances, rules and regulations. All materials and equipment specified herein shall be within the scope of Underwriter's Laboratory (UL) examination services, be approved by the UL for the purpose for which they are used and shall bear the UL label.

All control panels shall bear a label by UL or by an approved testing authority for the completed assembled panel.

Definitions

Contractor: The Contractor, as distinct from the Control System Integrator, shall install panels and other materials furnished by the Control System Integrator and provide all materials and work necessary and thereby, satisfy all requirements that are within the scope of this section.

Control System Integrator: A single company subcontracted by the Contractor, who shall design and furnish the system, provide the instrument panels; provide the control panel, startup, training services, and other instrument components.

Control System Programmer: A single firm, pre-selected and contracted by the owner, who shall furnish all programming, startup and training services related to programming. The Control System Programmer shall be RH2 Engineering, Inc.

Submittals

All submittals shall be complete, neat, orderly and indexed. Partial submittals will not be accepted. Submittal information shall be provided to the Owner for the following items:

- Remote I/O Panel (Winchester Water Treatment Plant)
- Radio Panel Modifications (Reservoir Hill)

- High Service Control Panel Modifications (Winchester Water Treatment Plant)
- Operation and Maintenance Manuals per Division 1.79.2 and Division 17.94
- Full size nameplate wording schedules, in lettering style proposed for use.

In addition to the requirements of Division 1.33, the Contractor shall develop and submit the following information provided by the Control System Integrator.

Hardware Submittals

Before any components are fabricated, and/or integrated into assemblies, or shipped to the site, the Contractor shall prepare a complete hardware submittal. The Engineer shall require five (5) sets, including fully detailed shop drawing, catalog cuts, wiring connections, and such other descriptive matter and documentation as may be required to fully describe the equipment and to demonstrate its conformity to these Specifications. The decision of the Engineer, upon the acceptability of any submittal, shall be final. Catalog information shall be submitted for all components and equipment, regardless of whether or not it is of the same manufacture as that listed in the Specifications.

System Plan Submittals

Following approval of the hardware submittal, the Control System Integrator shall prepare complete system interconnect wiring diagrams and panel layout plans for approval.

Plans

The Control System Integrator shall develop all shop drawings required for design, fabrication, assembly and installation of the control system. Shop drawings shall include all plans required in manufacture of specialized components and for assembly and installation of them.

Plans shall be prepared with a CAD program capable of exporting to AutoCAD format, and printed on 11-inch by 17-inch media. Plans shall have borders and title blocks identifying the project system, revisions to the plans, and type of plan. Each revision of a plan shall carry a date and brief description of the revisions. Diagrams shall carry a date and brief description of the revisions. Diagrams shall carry a uniform and coordinated set of wire numbers and terminal block numbers in compliance with panel work wiring. Additionally, one set of electronic .DWG files shall be provided to the Owner.

Elementary Diagrams

The Contractor shall provide elementary diagrams for all discrete loops. Loop diagrams shall be prepared in compliance with ISA S5.4 and shall be provided for all analog loops. Elementary diagrams and loop diagrams shall show circuits and devices of a system. These diagrams shall be arranged to emphasize device elements and their functions as an aid to understanding the operation of a system and maintaining or troubleshooting that system. Elementary and loop diagrams shall also show wire numbers, wire color codes, signal polarities, and terminal block numbers.

Panel Fabrication and Arrangements Plans

The Contractor shall provide arrangement plans of all panel front- and internal-mounted instruments, switches, devices, and equipment indicated. All panel mounting details shall be

shown. Outer dimensions of all panels shall be included on the plan. Deviations from approved arrangements require approval prior to installation.

Arrangement plans shall be drawn to scale using standard Architectural or Engineering scales.

Site Conditions

Specified instrumentation and control equipment shall be modified, if necessary, to make it suitable for operation in the ambient conditions specified in Division 16.

Warranty

In addition to any other warranties required by the specifications, the entire PLC system will be warranted against defects in materials, workmanship, and software functions for a period of two (2) calendar years following the successful completion of the Functional Acceptance Test (FAT). The Contractor or designated service organization will be available on 24-hour notice to correct any system problems without charge to the Owner during the warranty period. In addition, the Contractor will provide four 2-day site visits during the warranty period to perform inspection and calibration of the equipment or other work at the request of the Owner.

Extra Materials

The Contractor shall supply sufficient spare parts, components, and assemblies to replace *any* defective or malfunctioning control component provided in this system. Control components are considered any device or combination of devices without which normal automatic control as outlined in this specification cannot be accomplished, and includes:

1. Two (2) spares of each part, component, or assembly, if more than ten (10) of those components are normally in use in the system.
2. One (1) box of each fuse type provided on this project. If ten (10) or more of a fuse type is provided for the project, then two (2) spare boxes shall be provided.
3. One (1) spare circuit breaker of each rating type provided on this project.
4. One (1) spare relay of each rating type provided on this project.
5. One (1) spare of each type of Acromag Module.

Spare part components shall be packaged for at ease of field installation by non-trained personnel, so that no soldering or special skills are required for installation. All spare parts shall be delivered in a hinged plastic box that is purposefully made for this contract. The box shall have a parts list permanently attached to the inside lid which lists all parts and refers to them by numbered code visible on the outside of the package. Fragile components shall be adequately protected with cut foam. Electronic components shall be wrapped in ultra-violet inhibiting file. The exterior of the box shall be labeled "Telemetry Spare Parts – Water Department." Provide the box with lifting handles.

Part 2 – Products

Components

These Specifications list major instruments required to provide the process instrumentation system. All instrument functions specified on this list shall be provided by the Control System

Integrator. Any additional instruments required to complete the instrument loops because of certain characteristics of the particular equipment selected by the Control System Integrator shall be provided. Such additional instruments shall be provided and included in the original contract price even though not specified in the instrument index or on the Plans.

The following systems utilize automatic control:

- Engine generator set controls

Accessories

Provide all accessories required to furnish a complete control system that meets the requirements of the Plans and Specifications.

Source Quality Control

Material shall be new, free from defects, and of the quality specified. All equipment and materials utilized in the system shall be the products of Manufacturers with at least five (5) years of experience in the manufacture of similar equipment. Similar items in the system shall be the products of the same Manufacturer. All equipment shall be of industrial grade and of standard construction, shall be capable of long, reliable, trouble-free service, and shall be specifically intended for control and monitoring of operation of motor-driven pumps and equipment. All equipment shall be of modular design to facilitate interchangeability of parts and to assure ease of servicing.

Part 3 - Execution

Installers

Installation shall be performed by the workers who are skilled and experienced in the installation of I&C and Telemetry systems.

Installation

Installation and testing procedures shall be as specified in these and subsequent sections of this division.

The control system shall be installed in accordance with the installation plans and instructions prepared by the Control System Integrator.

Installation shall include all elements and components of control system and all conduit and interconnecting wiring between all elements, components, sensors, and valve operators.

Equipment shall be located so that it is readily accessible for operation and maintenance.

Field Equipment

Equipment shall be provided as specified on the Plans such that ports and adjustments are accessible for in-place testing and calibration. Where possible, equipment shall be located between 48 inches and 60 inches, unless specified otherwise on the Plans, above the floor or a permanent work platform. Instrumentation equipment shall be mounted for unobstructed access, but mounting shall not obstruct walkways. Equipment shall be mounted where shock or vibration will not impair its operation. Support systems shall not be attached to handrails, process piping or mechanical equipment except for measuring elements and valve positioners.

Instruments and cabinets supported directly by concrete or concrete block walls shall be spaced out not less than ⅝-inch by framing channel between instrument and wall.

Steel used for support of equipment shall be hot-dip galvanized after fabrication. Support systems including panels shall be designed in accordance with the Seismic Restraint and Anchorage section of Division 1.81 of these specifications and to prevent deformation greater than ⅛-inch under the attached equipment load and an external load of 200 pounds in any direction.

Electrical Power Connection

Electric power wiring and equipment shall be in compliance with Division 16. Power disconnect switches shall be provided within sight of equipment and shall be labeled to indicate opened and closed positions and specific equipment served. "Within sight of" is defined as having a clear unobstructed view from the equipment served and within 50 feet of the equipment served. Disconnect switches shall be mounted between 36 inches and 72 inches above the floor or permanent work platform. Where equipment location is such that the above requirements cannot be met by a single disconnect switch, two switches, one at the equipment and one at the work platform, shall be provided.

Signal Connection

Electrical signal connections to equipment shall be made on terminal blocks or by locking plug and receptacle assemblies. Jacketed flexible conduit shall be used between equipment and rigid raceway systems except that flexible cable assemblies may be used where plug and receptacle assemblies are provided and the installation is not subject to mechanical damage in normal use. The length of flexible conduit or cord assemblies shall not exceed 2 feet. Flexible cable, receptacle and plug assemblies shall be used only where specified.

17.06 Control System Integrator

Part 1 - General

Division of Responsibility

All instrumentation and industrial electronic systems shall be provided under the supervision of a single Control System Integrator, chosen by the Contractor, which is regularly engaged in the design and installation of such systems of similar scope and complexity. The Control Systems Integrator shall be enjoined by the Contractor as a Subcontractor. The assignment of specific responsibilities herein to the Control System Integrator shall not, in any way and under any conditions, diminish the Contractor's full and complete responsibility for all work performed and all materials installed under the contract. The contract between the Contractor and the Control System Integrator shall specifically require that the Control System Integrator conform to and meet all requirements specified in the contract documents.

The assignment of a Control System Integrator that is an equipment supplier shall not be acceptable.

Control System Integrator's Responsibility

The Control System Integrator shall be solely and completely responsible for the final design and assembly of the entire control system. Responsibilities include:

- Provision of, and the detailed design of, custom control panels and the motor control center. The plans show general layout of the control panels. The Integrator shall provide detailed scaled design of all components on and in the control panels and determine specific requirements.
- The design of all interconnecting wiring of control equipment including remote control panels, packaged equipment panels, mechanical equipment with control components, etc.
- Testing of the control panels in the Control System Integrator's shop.
- Coordinate with the Contractor for specific requirements and locations of raceway penetrations and field wiring in control panels.
- The Control System Integrator shall supply the Contractor with all necessary detailed installation plans and/or written instruction for installation of all control components and sensing devices for proper system operation.
- Coordinate with the Control System Programmer who has been selected by the Owner and are under separate contract with the Owner, to allow in-shop testing of the programming of all control devices and to execute the functions listed in the control strategies.
- Develop an assembly and testing schedule, with the Control System Programmer to allow for testing of all new programs in the Control System Integrator's shop.
- Provide installation assistance.
- Provide Startup and Training Services.

General and Electrical Contractor's Responsibilities

The General and Electrical Contractor shall be responsible for the following equipment and services:

- Review of the Control System Integrator's submittals and wiring diagrams for coordination with space requirements, raceway requirements of field wiring, etc.
- Supply the Integrator with submittals of equipment related to the control system that the Integrator must include in their submittals and integrate. Such as motors, packaged control panels that the Integrator does not build, etc.
- Installation of the control panels provided by the Control System Integrator.
- Installation of the interconnecting wiring in accordance with these documents and the Control System Integrators wiring diagrams.
- Installation of I&C and Telemetry System components in accordance with these documents and plans or instructions of the Control System Integrator.

Part 3 – Execution

Installers

The Control System shall be designed, constructed, programmed and commissioned by full time employees with a minimum of 5 years of experience (minimum of 1 year with Integrator).

Integrators List

The Control System Integrator shall be selected by the Contractor from the following acceptable companies (Alphabetical Listing):

- Control Systems Northwest (CSNW) – Medford, Oregon
- Industrial Systems, Inc. – Vancouver, Washington
- Olsson Industrial Electric – Springfield, Oregon
- Pacific Electrical Contractors (ORPAC) – Medford, Oregon
- Taurus Power and Controls, Inc. – Tualatin, Oregon
- The Automation Group (TAG) – Eugene, Oregon

Alternative Integrators

Alternate Control System Integrators not listed above shall be considered for acceptability by the Owner based on following qualifications:

1. The Control System Integrator shall be an instrument and control system manufacturing company.
2. The Control System Integrator's manufacturing and assembly facility shall be located within a 200-mile drive from Roseburg, Oregon.
3. The Control System Integrator shall be specialized in the design, assembly, testing, installation and service of municipal water and wastewater control and communication systems in the Pacific Northwest for at least five years.
4. The Control System Integrator shall employ technicians and engineers with documented experience in the design, assembly, testing, installation, operation, calibration, trouble-shooting, service and repair of control, and communication systems for municipal water and wastewater utilities.
5. The Control System Integrator shall have completed the design, assembly, testing and installation of control systems that include the instruments and devices cited on the Plans by specific manufacturer's name.

An alternate Control System Integrator selected by the Contractor shall be subject to the approval by the Owner. Prior to placement of purchase orders for services and equipment, the Contractor shall provide the following information about the selected alternate Control System Integrator for review by the Owner:

1. Description of ownership and organization of Integrator.
2. Resumes of principals and/or key employees who will be working directly in the engineering, assembly, testing and commissioning of the system for this project.

3. Description of expertise in design, assembly, testing and installation of control systems for municipal utility facilities.
4. Description of municipal control systems designed, assembled and installed in the last 5 years. Description shall include:
    - Names of employees involved in each system.
    - Detailed description and plans of each system.
    - Cost of each system.
    - Names and telephone numbers of persons involved in operation and maintenance of each system.
    - Description of the service capabilities normally provided by the company including resumes of employees assigned to field service and listing of service equipment.
    - Additional information that may assist the Owner in ascertaining the company's general ability to perform the work. The acceptability of the Integrator will be determined solely by the Owner.

Approval of Personnel and Alternatives

The Contractor and the selected Control System Integrator shall anticipate that the Owner may withhold approval of the selected Integrator or employee if, in the opinion of the Owner, the Control System Integrator or employee does not have the experience, capability or an acceptable performance and execution record of similar projects in the past.

Neither the Contractor or Control System Integrator or employee not approved by the Owner, shall be entitled to an extension of time or to any claim for damages because of extra and unanticipated costs, hindrances, delays or complications caused by or resulting from the Owner not approving any Control System Integrator or employee for whatever reason.

17.07 Control System Programmer (Control System Programmer Contracted Directly by Owner)

Part 1 - General

Division of Responsibility

The Control System Programmer shall be selected and Contracted for the control system programming by the Owner. The Control System Programmer Contracted by the Owner is RH2 Engineering, Inc., who may be contacted at (425) 951-5386. It is the responsibility of the Control System Programmer to provide PLC programming that will accomplish control of the proposed and modified systems as described in the Specifications and Plans.

Control System Programmer's Responsibility:

The Control System Programmer Responsibilities include:

- Develop a testing schedule to allow for testing of all new telemetry panel programs.

- Notify the Control System Integrator of all components needed to test equipment panels.
- Software testing of the control panels in the Control System Integrator's shop.
- Programming of the PLC, operator interface, and HMI Computer System.
- Provide required software startup, troubleshooting, and commissioning services needed to complete implementation of programs.

17.08 System Description

Part 1 – General

Summary

The I&C and Telemetry system functions required are specified on the Plans and in subsequent sections of this Division.

Design and Performance Requirements

The system shall be designed to provide the control capabilities and functions indicated and implied by the Plans and these Specifications and to provide trouble-free operation with minimum maintenance. The system shall readily enable manual operation of any and all functions in the event of failure of any one component.

The control system shall be designed and assembled by the Control System Integrator to provide:

- Control of motor driven pumps, equipment, and processes.
- Monitoring of operation of motor driven pumps, equipment, and processes.
- Indication of operating status of motor driven pumps, equipment, and processes.
- Monitoring and indication of pressures, temperatures, levels, and flows, as indicated and implied by the Plans and Specifications.
- The capabilities indicated and implied by the Plans and Specifications.

The I&C and Telemetry System shall be designed and assembled by the Control System Integrator to be an integrated system composed completely of components which are specifically designed and used for and in conjunction with control and operation of motor-driven pumps and process control equipment. The Control System Integrator shall supply all interfacing equipment, appurtenances and accessories and all such devices that may be required for proper interfacing as part of the control system.

Project Conditions

Panel sites included in this project are:

1. Reservoir Hill – Radio Panel Modifications
2. Winchester Water Treatment Plant – Remote I/O Panel
3. Winchester Water Treatment Plant – High Service Control Panel Modifications

Part 2 – Products

Components

The I&C and Telemetry System shall include the instruments, control devices, Remote Telemetry Unit, Human Machine Interface, input and output devices, sensors, interfacing devices, cabinets, enclosures and other components indicated and implied by the Plans and Specifications.

Part 3 – Execution

Preparation

The Control System Integrator shall be responsible for the coordination and integration of control system with the motor control and other related equipment. The Control System Integrator shall communicate directly with the Manufacturer(s) and Supplier(s) of all related equipment to determine all details of the equipment, which may influence or affect the control system. The Control System Integrator shall determine all requirements for and shall cause integration of the control system into a unified operating system. The Control System Integrator shall define all requirements for all interfacing equipment and shall supply all appurtenances, accessories and all such devices, which may be required for proper interfacing as part of the control system.

The Control System Integrator shall be responsible to obtain submittal information on equipment supplied by other disciplines and to integrate them into the control system to form a complete working package as outlined by the contract documents.

Installation

The system shall be completely assembled in the shop by the Control System Integrator. All components and equipment shall be prewired to the maximum extent possible.

All Process Control shall be done within the control panels unless specifically listed on the Plans as other.

17.10 PANELS

17.12 Equipment Panels

Part 1 – General

Related Sections

Division 10.14.23 Panel Signage. All panels shall be labeled.

References

Panels shall meet the requirements of UL-508 for water systems and UL-913 for sewer systems. All panels shall bear the appropriate label. The provider of the panels shall be a UL-508A certified facility. All field modifications shall be in conformance with UL-508 or UL-913.

Design Requirements

Control equipment panels shall be enclosures conforming to the requirements of the National Electrical Manufacturers Association (NEMA) and shall be NEMA 4X Stainless Steel for outdoor use.

Part 2 – Products

Components

- Enclosure shall be constructed of steel.
- Minimal metal thickness shall be 14-gauge.
- All doors shall be rubber-gasketed with continuous hinge and key locking latch mechanism.
- Wherever practical, enclosures shall be a manufactured item.
- All doors shall be provided with quick-release latches to secure cover.
- Panels shall be sized to adequately dissipate heat generated by equipment mounted in or on the panel.
- Enclosure shall include a backpan.
- Enclosure shall be finished in ANSI 61 gray polyester powder coating inside and out over phosphatized surfaces.
- The enclosure shall be oversized to accommodate future racks and auxiliary devices as required.
- All outdoor enclosures shall be provided with a control panel heater and ventilation fan and filter with built-in thermostat to provide adequate climate control.

Fabrication

Panels should be completely fabricated, and instruments installed and wired in the manufacturer's factory (where possible). All wiring shall be completed and tested prior to shipment. All external connections shall be by way of numbered terminal blocks. Panel cutouts for instruments and devices shall be cut, punched or drilled and smoothly finished with rounded edges.

17.20 PANEL COMPONENTS

Part 1 - General

Design Requirements

All components shall be suitable for installation inside the I&C and Telemetry system panel enclosure.

17.20.3 Terminal Blocks

Part 1 - General

Design Requirements

Terminal blocks shall be one-piece molded plastic blocks with screw-type terminals and barriers rated for 600 volts. Terminals shall be double-sided and supplied with removable covers to prevent accidental contact with live circuits. Terminals shall have permanent, legible identification, and be clearly visible with the protective cover removed.

Fusible terminal blocks shall be provided with a LED blown fuse indicator for each terminal.

Part 3 - Execution

Installation

All wires between panel-mounted equipment and other equipment shall be terminated at terminal blocks. Switches shall be terminated at the terminal blocks with crimp-type, pre-insulated, ring-tongue lugs. Lugs shall be of the appropriate size for their terminal block screws and for the number and size of the wires terminated.

17.21 Power Supply and Protection

17.21.2 Normal Power Supply

Part 1 - General

Design Requirements

All equipment panels shall be provided with 120-volt, 60-Hz power. Make provisions for conduit entry and provide a terminal block for termination of the circuit wires. All electronic control panel components shall require a 120 VAC-24 VDC power supply. DC power supply shall be sized to provide at least 50 percent more current than the peak current demands of the control panel. DC power supply shall have UPS backup power capabilities as identified in Section 17.21.3. Protection equipment shall consist of circuit breakers and fuses to protect electrical circuits from short circuits and overloads.

Part 2 – Products

Manufacturers

DC power supplies shall be Puls Inc., Sola Inc., Allen-Bradley, or approved equal.

Fuses shall be Bussmann Manufacturing Model ABC or MDA rated for Branch circuit, or approved equal.

Circuit Breakers shall be Allen-Bradley rated for Branch circuit, or approved equal.

Part 3 – Execution

Construction

Branch circuits shall be individually fused with an indication of fuse opening. All fuse holders for the panel shall be grouped on a single sub-panel. They shall be so situated that when the

panel door is opened there is a clear view of the indicators and clear access for replacement of the fuses.

Provide DC power supplies as required to power instruments requiring external DC power of the appropriate voltages, with sufficient voltage regulation and ripple control to assure that the instruments being supplied can operate within their required tolerances. The power supplies at all RTUs shall include batteries for a backup power supply and charging equipment.

17.21.3 Backup Power Supply

Part 1 - General

Design Requirements

All equipment panels shall have an Uninterruptable DC Power Module that interfaces with the Normal DC Power Supply. The Uninterruptable DC Power Module shall be capable of powering the control panel equipment after normal power failure. Transfer shall be a non-mechanical, non-interruptible, smooth transfer to battery backup.

Remote equipment batteries shall be sealed lead-acid batteries of sufficient ampere hour capacity to meet the above requirements.

Performance Requirements

The master console shall display power failure, and also a low battery condition alarm for the new equipment. A power failure alarm shall occur in the format currently used by the system. A low battery condition alarm shall cause the alarm indicator to flash but will not sound the audible alarm. The indicating light shall go off when the alarm condition is clear.

Part 2 – Products

Manufacturers

DC UPS equipment shall be Puls Inc., Sola Inc., Allen-Bradley, or approved equal. Backup DC batteries shall be PULS model number UZB12.261, SOLA model number SDU 24-BAT, or equal.

Part 3 – Execution

Installation

Batteries, battery chargers, and necessary wiring shall be installed to meet the above specifications.

17.21.5 Line Protection Units – Low Current

Part 1 - General

Design Requirements

The line protection unit shall isolate and protect the I&C electronics from current and voltage surges in the transmission lines. Each protection unit shall have:

- An isolation transformer with a minimum of 1,500 volts AC isolation, primary to secondary, and a minimum saturation current of 100 milliamps (ma) S.C. or as required to protect the I&C equipment from damage.
- Separate line-side and equipment-side terminal blocks.
- Two clip-mounted, replaceable gas discharge tubes rated at 90 volts striking voltage and 5,000 ampere peak pulse current capacity and suitable ground strap.

Part 2 - Products

Manufactured Units

The line protection unit shall be a complete unit, mounted on a separate chassis, and be field replaceable without soldering. The chassis shall be a ¼-inch thick plate.

17.21.6 Line Protection Units – High Current

Part 1 - General

Design Requirements

The line protection unit shall isolate and protect the I&C electronics from current and voltage surges in the transmission lines. Each protection unit shall have:

- A minimum continuous operating current rating of 30 amps or larger as required to protect the telemetry equipment from damage.
- A minimum peak surge current rating of 80 KA.
- Separate line-side and equipment-side terminal blocks.
- LED indicator for circuit diagnostics.
- A response time less than or equal to 1 nanosecond.

The line protection unit shall be a complete unit available as a surface mount or DIN rail.

Part 2 - Products

Manufacturers

The line protector shall be an Allen-Bradley Model 4983-DC120-20 or equal.

17.22 Wire and Cable

17.22.2 Wiring

Part 1 - General

References

All electrical wiring shall be in accordance with the NEC.

Design Requirements

Wires shall be 600-volt class, PVC insulated, stranded copper and shall be the sizes required for the current to be carried but not less than No. 14 AWG conductor size.

Wires for signal circuits shall be twisted shielded pairs not smaller than No. 18 AWG.

Part 3 – Execution

Installation

All power wiring shall be supported on a sheet metal raceway or enclosed in a plastic wiring duct. Wiring for signal circuits shall be separated at least 6-inch from any power wiring.

17.22.3 Cables

Part 1 - General

Design Requirements

Cables and connectors shall be industry standard, shielded, and shall be provided to connect all peripherals and equipment.

17.24 Switches and Relays

17.24.4 Panel Relays

Part 1 – General

Design Criteria

Relays shall be provided as necessary to perform switching functions required of control panels and other control circuits as shown on the Plans and described in the technical specifications. Appropriate relay type and associated contacts shall be selected based on the application from the control wiring diagrams or the functional description. Where timing relays and control relays require additional contacts, provide auxiliary control relays properly sized for the application.

All contacts and relays shall be NEMA rated and UL recognized.

The electrical life expectancy for the relay shall be over 500,000 operations at 120V AC, 10 amps; (over 200,000 operations at 120V AC, 10 amp for SPDT, 3PDT, and 4PDT). The mechanical life expectancy for the relay shall be over 50,000,000 operations.

Part 2 – Products

Manufacturers

Control Relays

Square D Class 8501, Type K or R; Allen Bradley 700 Type HA or HB; IDEC RH Series; or equal.

Manufactured Units

Control Relays

Relays for general purpose use shall be DPDT or 3PDT, 10 amp contacts with the appropriate coil voltage for the application. Relays shall be plug-in type with matching socket. All relays shall have LED indicators to signal when the coil is energized. Relay coils shall be rated for continuous duty.

Part 3 – Execution

Installation

Provide additional form C contacts over and above the number indicated on the Plans for all relays provided.

120 VAC relays shall not be interchangeable with other voltages to prevent a hazardous interchange of relay voltages.

Provide DIN mounted or panel mounted type depending on application.

17.30 INTELLIGENT CONTROL UNITS

17.31.2 Programmable Logic Controller (PLC) System

Part 1 - General

Summary

Work involved in this contract includes providing new Remote I/O equipment and modifying existing programming to provide the functions shown on the Plans and described herein.

Performance and Design Requirements

- The PLC system modifications shall accomplish the control requirements of the loop descriptions, Plans, and Specifications.
- The design application and installation of the PLCs shall conform to NEMA ICS 1.1.
- PLC programming shall be documented.
- All PLC control system components shall be capable of meeting or exceeding electromagnetic interference tests per ANSI/IEEE C37.90.2.

Part 2 – Products

Manufacturers

Remote I/O components added to this Contract shall be Acromag. No substitutions.

Refer to project Telemetry Panel plans for specific Acromag component numbers and quantities.

Components

Input/Output (I/O) Modules

a) Provide plug-in modular-type I/O racks with cables to connect to all other required PLC system components.

b) Provide I/O system with:

1. I/O solid state boards with status lights indicating I/O status and board failure.
2. Electric isolation between logic and field device.
3. Interchangeable boards for similar I/O type to allow substitution of operating boards for failed units by the operator.
4. Capability of withstanding low energy common mode transient to 1500 V without failure.
5. Incorporate noise suppression design.
6. Capable of meeting or exceeding surge-withstand capability tests, per ANSI/IEEE C37.90.1.
7. Capable of meeting or exceeding electrical noise tests, NEMA ICS1-109.60-109.66.

c) Discrete I/O modules:

1. Interface to ON/OFF devices.
2. I/O status indicator on module front.
3. Voltage rating to match circuit voltage.
4. Output module current rating:
   a. Match maximum circuit current draw.
   b. Minimum 1.5 A/point for 120 V AC applications.
5. Isolated modules for applications where one module interfaces with devices utilizing different sources of power.
6. Individually fused outputs with blown fuse indication.

d) Analog I/O modules:

1. Input modules to accept signals indicated on Plans or Specifications.
2. 12-bit minimum resolution.
3. I/O chassis supplied power for powering connected field devices.
4. Isolated (differential) inputs and outputs.
5. User configurable for desired fault-response state.
6. Provide output signals as indicated on Plans and Specifications.
7. Individual D/A converter for each output module.

8. Individual A/D converter for each input module.

Data Highway Communications

1. All PLC controllers shall be capable of EtherNet/IP communications. Any additional industrial protocols shall be provided through protocol converters.

Part 3 - Execution

Installers

Control System Integrator and programmers shall have had experience in design, installation, and start-up of at least three similar installations using the proposed hardware and software.

Installation

Provide a completely integrated distributed programmable controller system capable of analog and sequential control, data acquisition and display, alarm annunciation and communications using the PLC system. I/O cards and memory shall be added as necessary to complete work shown on the Plans and described in the specifications.

The system shall provide true distributed control wherein each PLC is an intelligent stand-alone controller programmed for the specific functions required at its respective location. Certain information in the form of control commands, interlocks and data will be passed directly between the PLCs for use in executing the local control programs.

Input/Output Connection Requirements

1. Make connections to I/O subsystem by terminating all field wiring on terminal blocks within the I/O enclosure.
2. Prewire I/O modules to terminal blocks.
3. Provide terminal blocks with continuous marking strip.
4. Size terminals to accommodate all active data base points and spares.
5. Provide terminals for individual termination of each signal shield.
6. Field wiring shall not be disturbed when removing or replacing an I/O module.

PLC Installment

1. Component placement:
    a. Mount all components according to manufacturer's instructions.
    b. Locate incoming line devices (isolation or constant voltage transformers, local power disconnects, surge suppressors, etc.) so as to keep power wire runs within an enclosure as short as possible.
    c. If items such as magnetic starters, contactors, relays and other electromagnetic devices are located within the same enclosure as the PLC system components, provide at least 6 inches of separation between the magnetic area and the control area.
    d. Oversize enclosure to accommodate future racks and auxiliary devices as required.

2. Provide enclosure with a single quick disconnect of incoming power. Mount disconnect switch or breaker on enclosure exterior and label.
3. Enclosures shall comply with these specifications.
4. Enclosures shall be equipped with H2S inhibitor(s) suitable for the enclosed volume.

17.33 Network Equipment and Computers

17.33.1 Industrial Network Equipment

Part 1 – General

Design Requirements

All specified "industrial network equipment" shall comply with the following minimum specifications:

1. Rated for a 5-30VDC power supply.
2. UL listed.
3. Designed for an industrial environment.
4. Operating temperature of -40 degrees Fahrenheit to 176 degrees Fahrenheit.
5. IP66 rated water and dust resistant.
6. Control network device shall be capable of remote monitoring using OPC protocol.
7. All devices on fiber backbone shall have a minimum of two sets of transmit/receive ports.
8. Twisted pair network speed shall be a minimum of 100Base-TX.
9. Fiber optic network speed shall be a minimum of 100Base-FX.
10. Fiber optic network shall be multimode.

These requirements do not apply to non-industrial network equipment.

Part 2 - Products

Control Network Equipment

Data highway communications shall be accomplished on a control network consisting of nodes, one at each PLC or computer workstation and a physical link layer consisting of cables and all interfacing hardware. Control Network equipment shall consist of the following devices.

Unmanaged Ethernet Switch at Remote I/O Panel and High Service Control Panel

Two (2) N-Tron 308FX2 Ethernet Switches with SC ports, or equal.

Fiber Optic Patch Panel at Remote I/O Panel and High Service Control Panel

Two (2) FiberTek DPPT12 Din Rail Mount Fiber Patch Panel with 12 Ports and SC adapters, or equal.

Part 3 – Execution

Installation

All network equipment in Control Panels shall be installed as per Plans, specifications and product installation instructions. All components shall be suitable for installation in the environment where installed. All devices shall be installed as specified by the manufacturer. All devices shall be installed to be field serviceable without taking the facility out of service. Device displays shall be positioned to be easily read when viewing directly into control panels.

17.90 TESTING, STARTUP, AND TRAINING

17.90.1 Common Work for Testing, Startup, and Training

Part 1 – General

Summary

Total system hardware start-up is the responsibility of the Control System Integrator.

Maintenance

The Control System Integrator shall be solely and completely responsible for all hardware maintenance of the system from time of start-up to the date of acceptance, by formal action of the Owner, of all work under the contract. The Control System Integrator shall perform all such work required or considered to be required by the Owner to cause and maintain proper operation of the system and to properly maintain the system.

Warranty

The Contractor shall cause the Control System Integrator to 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 two-year guarantee period. The Control System Integrator shall begin all repairs, replacements, modifications and adjustments within twenty-four (24) hours of notification by telephone by the Owner and shall complete such repairs, replacements, modifications and adjustments within forty-eight (48) hours of notification. Should the Control System Integrator fail to begin the work within 24 hours or complete the work within 48 hours, the Owner may proceed to undertake or complete the work. In such event, the Contractor and his surety shall be liable for all costs incurred by the Owner.

Part 3 – Execution

Field Quality Control

Equipment Manufacturer's Support

1. The Control System Integrator shall pay for services of equipment manufacturer's field service representative(s) to:
    a. Inspect equipment covered by these Specifications.
    b. Supervise adjustments and installation checks.
    c. Conduct start-up of equipment and perform operational checks.

d. Provide Owner with a written statement that manufacturer's equipment has been installed properly, started up and is ready for operation by Owner's personnel.

Repairs

The Control System Integrator shall correct all deficiencies and defects and make any and all repairs, replacements, modifications, and adjustments as malfunctions or failures occur.

The Contractor and the Control System Integrator shall anticipate that the Owner may delay acceptance of all work under the contract if, in the judgment of the Owner, malfunctions or failures in operation of the control system repeatedly occur after start-up. Both the Contractor and the Control System Integrator shall not be entitled to an extension of time or to any claim for damages because of hindrances, delays or complications caused by or resulting from delay by the Owner in accepting the work because of malfunctions or failures in operation of the control system.

17.91 Tests and Inspections

Part 1 - General

Summary

Materials, equipment, and construction included under this specification shall be inspected in accordance with the specifications. Testing shall be performed by the Control System Integrator in accordance with Division 16, and this and subsequent sections of this division. Testing shall be required to determine if installed equipment and system(s) will operate in the manner in which they are intended to operate. The decision of the Owner upon the acceptability of the test procedures and conformance shall be final. The work will not be accepted until all testing has been satisfactorily performed.

Scheduling

The Contractor shall prepare factory and field test procedures to demonstrate conformance of the complete system to this specification. The Contractor shall submit the detailed test procedures within four weeks after the notice to proceed for the Engineer’s review and approval.

The Contractor shall furnish all labor, materials, tools, equipment, instruments and services necessary to perform all specific functional testing of all installed equipment and systems at no additional cost.

The Control System Integrator and Contractor shall notify the Owner and Engineer (Control System Programmer) of the factory testing date 30 days before testing.

The Contractor and Control System Integrator shall include in the schedule 10 consecutive working days as part of the factory testing for the Control System Programmer to test the control system software with the hardware supplied by the Control System Integrator at the Control System Integrator’s shop.

The Control System Integrator and Contractor shall submit to the Engineer (Control System Programmer) a detailed field testing schedule identifying each day that both the Control System Integrator and Control System Programmer will need to be on site for field testing of equipment. A preliminary schedule shall be submitted to the Engineer for review 60 days

before testing. A final schedule shall be submitted to the Engineer for review 30 days before testing.

The Contractor and Control System Integrator shall include in the construction schedule 10 consecutive working days between the completion of field testing and the startup phase for the Control System Programmer to perform field software testing. Startup shall not proceed until the software field testing is complete.

Part 2 – Products

Factory Testing

All factory testing of control panels and computer systems shall be performed at the Control System Integrator's shop.

The completed control system shall be tested in the shop by the Control System Integrator and the Control System Programmer. All motor control centers and VFD's supplied by the Control System Integrator shall be interconnected with the control system and powered with rated incoming voltage. Testing shall be conducted in two phases. The initial hardware testing shall include, but not be limited to, operation of all input and output (I/O) points, control devices and motor controllers. The subsequent testing shall include, but not be limited to, testing of RTU programming and Operator Interface provided by the Control System Programmer.

The initial hardware testing of the control system shall include the following:

1. The entire assembled panels shall be meggered and tested to be free from grounds and shorts.
2. Energize each discrete input and output and simulating each analog input and output using a loop simulator and calibrator. Circuits not energized shall be tested for continuity. Discrete input signals shall be tested in both the "on" and "off" state. Analog signals shall be tested at a minimum of three values (4 mA, 12 mA, and 20 mA). The test results shall be documented by the Control System Integrator in checklist format. The final test results shall be signed by both the Engineer and Control System Integrator prior to shipment of equipment to the job site.
3. Provide signal generators, multimeters, and other test equipment as required to verify proper operation of the assembled panels.
4. The Control System Integrator shall interconnect the control panels with the motor control centers and VFD's for both hardware and software testing phases. Control panels shall initially be hardware tested in one group. Similarly, the motor control centers and VFD's shall be hardware tested in another group. After both groups of hardware are confirmed to be operating correctly, the Control System Integrator shall interconnect the equipment with Ethernet cables and analog and discrete wiring as shown on the Plans. The equipment shall remain connected for the remainder of the factory testing period.
5. Correct, replace, or repair control panel and motor control center wiring, and/or components until testing demonstrates proper operation. Control panels and motor

control centers shall not be shipped to the job site until testing has demonstrated complete operation of the panels.

6. Provide updated and complete as-built drawings for the control panels and motor control centers at the time of final factory testing. The Engineer shall review the drawings against the panel construction at the time of final factory testing. Drawings which do not reflect the actual construction of the panel shall be revised and reviewed again by the Engineer. As-built drawings that require revisions shall be submitted to the Engineer for review prior to shipment of equipment to the job site. This review process shall be repeated as necessary so that as-built drawings reflect the actual construction of the panels and motor control centers at the time of shipment. Panels and motor control centers shall not be shipped to the job site until the as-built drawings are updated, complete, and reflect the actual as-shipped status of the equipment.

Upon completion of the initial hardware testing, Control System Programmer shall conduct software testing for final inspection by the Owner. The Control System Integrator shall provide for time, equipment and support in their shop for Control System Programmer to completely demonstrate the functions of the entire control system. All control functions and all status and alarm monitoring and indication shall be demonstrated under simulated operating conditions. Simulating equipment shall be provided and wired into the control system for this testing. Testing shall be continued for the time period required by the Owner to observe and verify any revisions and as described above in the scheduling portion of this specification.

Part 3 – Execution

Field Quality Control

Following installation by the Contractor, the Control System Integrator will verify the correctness of the interconnecting wiring and energize all control equipment in the field. Each point at the controller(s) shall be checked for proper functional operation through communication with the central computer.

Field Tests

The Control System Integrator in conjunction with the Contractor shall conduct field tests of all panels, motor control centers, VFD's, and instrumentation in the presence of the Engineer after installation of the equipment at the site. Testing shall be conducted by physically actuating signaling devices, installing temporary jumpers, or artificially imposing signals on the field wiring. This shall be done to establish proper operation of the field devices, the integrity of the field wiring, and the proper connection of field devices to the panels. The Contractor and Control System Integrator shall coordinate with the Engineer to provide for as complete testing of the control system as is practical prior to placing the equipment on line for actual control and monitoring. The Contractor and Control System Integrator shall make corrections or repairs to the wiring and/or devices as necessary to provide proper operation of the system.

After the initial testing is complete, commissioning shall be accomplished by the Control Systems Integrator, Control System Programmer, and Contractor, with the Owner and Engineer present. Commissioning shall include operation and verification of all control

components and features of the entire control system. Each function shall be demonstrated to the satisfaction of the Owner.

Repairs

Should any part of the system fail during the test, the test shall be rescheduled and repeated to the satisfaction of the Owner after repairs.

17.92 Startup

Part 1 – General

Summary

All testing, startup and operation shall not be cause for claims for delay by the Contractor, and all expenses accruing therefrom shall be deemed to be incidental to this contract. The Contractor shall make arrangement for all materials, supplies and labor necessary to efficiently complete the testing, startup and operation.

Startup shall consist of testing, by a simulated operation, all operational equipment and controls. The purpose of these tests shall be to check that all equipment will function under operating conditions, that all interlocking controls and sequences are properly set, and that the facility will function as an operating unit.

Scheduling

Factory representatives of all major units shall be present for the startup phase. The test shall continue until it is demonstrated that all functions of controls and machinery are correct.

Part 3 - Execution

Field Quality Control

When the installation of the Control System is substantially complete, the Contractor shall commence with calibration and field testing. Testing shall determine that all system components connect up correctly to each other so that the system works as designed. Refer to section 17.91 for field testing requirements.

All components of the control system shall be calibrated by the Control System Integrator after completion of installation. Each component shall be adjusted to be within the Manufacturer's required range and for the specific application.

Components that cannot be properly calibrated or that are found to exceed the Manufacturer's specified range or accuracy shall be removed and replaced at no additional cost to the Owner.

The control system shall be placed into operation by the Control Systems Integrator and Control System Programmer.

The Control System Integrator shall calibrate all instruments, indicators, recorders, loops, etc. and shall provide a five-point calibration test results sheet for each calibrated instrument supplied by the Control System Integrator. The five-point calibration shall include one point at: Minimum input range value, Maximum input range value, Midrange input value, no other point less than 25 percent of span to any other point. Test forms shall identify each instrument

tested, input conditions vs. output signal results in tabulated form, and shall be submitted to the Engineer prior to final commissioning.

Repairs

All deficiencies observed during the start-up will be corrected by the Contractor.

17.93 Training

Part 1 – General

Submittals

Submit index of all training offered by PLC system equipment manufacturers including operation and maintenance.

The Control System Integrator shall prepare and assemble specific instruction materials for each training session and shall supply such materials to the Owner at least 2 weeks prior to the time of the training.

The Control System Programmer will provide additional training that is separate from this contract.

Part 3 – Execution

Hands-On Training

The Control System Integrator shall conduct specifically organized training sessions in operation and maintenance of the control system for personnel employed by the Owner. The training sessions shall be conducted to educate and train the personnel in maintenance and operation of all components of the control system. Training shall include, but not be limited to, the following:

1. Preventative maintenance procedures
2. Trouble-shooting
3. Calibration
4. Testing
5. Replacement of components

One training session, at least 2 hours in duration, shall be conducted at the facility after start-up of the system.

17.94 Documentation

17.94.2 Operations and Maintenance Manuals

Part 1 – General

Summary

Two types of operation and maintenance manuals (O&M) will be required for the contract:

1. General manuals for use by the Water Department staff for daily operation, maintenance and troubleshooting.
2. Technical manuals for use by trained electronics technicians for technical and "board level" maintenance and repair.

Submittals

Prior to the receipt of payment for more than 50 percent of the work, the Contractor shall deliver to the Owner five sets of acceptable manufacturer's operating and maintenance instructions covering each piece of mechanical and electrical equipment, or equipment assembly, furnished under this contract. Each set of instructions shall be bound into multiple volumes; each volume to be complete with and index and bound in a suitable hard-cover binder. Manuals shall be assembled and indexed so that information on each piece of equipment can be readily found. Any additional operating and maintenance instructions from the Control Systems Programmer will be submitted separately.

Quality Assurance

Manuals shall be purposefully made for this installation, and general manuals which are vague or have limited applicability will not be accepted. The manuals shall be written in a non-technical format suitable for reading by water system operators with no previous automatic control equipment experience. The decision of the Owner on the acceptability of the manual shall be final.

Part 2 – Products

Materials

The Control System Integrator shall prepare and assemble detailed operation and maintenance manuals in accordance with the project general requirements. The manuals shall include, but not be limited to, the following:

1. Name, location and phone number of nearest supplier and spare part warehouse.
2. Step by step operating procedures.
3. Narrative of overall system performance and operation.
4. Listing of all equipment setpoints.
5. Preventative maintenance procedures
6. Trouble-shooting of master and remote equipment.
7. Calibration
8. Testing
9. Replacement of components
10. System schematics / shop drawings
11. As-built elementary and one-line diagrams
12. Catalog data and complete parts list for all equipment and control devices
13. Listing of recommended spare parts.

14. Listing of recommended maintenance tools and equipment.
15. Warranties.
16. Disassembly and reassembly instructions.

All plans shall be provided on hard copy and in electronic form on disk. Electronic drawing files shall be provided in AutoCAD .DWG format with all "xrefs" bound. If "xrefs" are not bound, all "xref".DWG files shall be provided unlinked with instructions to reestablish the links. Files shall be in AutoCAD 2010 or later format.

18.0 GENERAL

It is the intention of these specifications that performance of work under bid items shall result in complete construction, in proper operating condition, of improvements identified in these written specifications and accompanying plans. Work and material not specifically listed in the proposal, but required according to the plans and specifications and general practice, shall be included in Contractor's bid price.

Water Treatment Plant Standby Generator

Schedule A Base Bid

The Schedule A Base Bid for the Water Treatment Plant Standby Generator project includes the installation of permanent standby diesel generators at the City's Water Treatment Plant and Reservoir Hill locations, installation of a diesel fuel tank at the City's Water Treatment Plant, and electrical system improvements at the City's Water Treatment Plant, Reservoir Hill, Dixonville Pump Station No. 2, Garden Valley Pump Station, Hawthorne Pump Station, Kline Pump Station, and Ventura Pump Station. Construction at the Water Treatment Plant and Reservoir Hill includes site work and construction of concrete pads.

Bid Item 1 – Mobilization, Demobilization, Site Preparation, and Cleanup

Lump sum price covers complete cost of furnishing, installing and testing, complete and in-place, all work and materials necessary to: move and organize equipment and personnel onto the job site; secure job site; provide and maintain necessary support facilities; obtain all necessary permits and licenses; prepare site for construction operations; maintain site and surrounding areas during construction; provide system testing and startup, move all personnel and equipment off site after contract completion, and provide as-built data; cleanup site prior to final acceptance; and accomplish all other items of work not specifically listed in other divisions. Payment shall be lump sum.

No more than 80-percent of bid amount for this item will be paid before final payment request, and this bid amount may not be more than 10-percent of value of total contract.

Bid Item 2 – Site Work

Lump sum price shown shall cover the complete cost of providing all site work relating to construction of improvements as shown on the Plans and specified herein. Work includes, but is not limited to: surveying and staking control necessary to construct the improvements; structure excavation, backfill, and compaction; site grading and paving; temporary erosion and sedimentation control; disposal of excess material; control of water; landscaping and irrigation repair; trenching; excavation; removal of unsuitable materials; select bedding; backfill; appurtenances; restoration for underground utilities; trench resurfacing; and all other work necessary for a complete installation of all site work and underground utilities. Payment shall be lump sum.

Bid Item 3 – Earthwork

Lump sum price shown shall cover the complete cost of providing all earthwork relating to construction of improvements as shown on the Plans and specified herein. Work includes, but is not limited to: temporary and final excavation, backfill, and compaction; haul and disposal of excess material; control of water; select backfill; import structural fill; finish grading; and all other work necessary for site earthwork. Payment shall be lump sum.

Bid Item 4 – Unscheduled Excavation

The unit price shown shall cover the complete cost of providing all materials, equipment, and labor necessary for excavation and disposal that is beyond the limits shown on the project plans and is performed at the Owner's request. Excavated material shall be replaced with import structural fill.

Price includes haul and disposal of excavated material, and replacement with import. Measurement shall be per ton of imported material.

Bid Item 5 – Unscheduled Backfill

The unit price shown shall cover the complete cost of providing all materials, equipment, and labor necessary for unscheduled backfill that is beyond the limits shown on the project plans and is performed at the Owner's request.

Payment shall be per cubic yard of material as measured in place.

Bid Item 6 – Structural

Lump sum price shown shall cover the complete cost of providing all materials, equipment and labor necessary for constructing the concrete generator / fuel tank pads and bollards complete as shown on the Plans and detailed in the contract specifications including: cast-in-place concrete, pre-cast concrete, miscellaneous metal work, patching, repairing, and testing. Payment shall be lump sum.

Bid Item 7 – Electrical

The lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for the electrical work shown on the Plans, and detailed in the contract specifications. Payment shall be lump sum.

Bid Item 8 – Automatic Control

Lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for the automatic control system as shown on the Plans, and detailed in the contract specifications. Payment shall be lump sum.

Deductive Bid Schedule B

Bid Item 1 – One (1) Portable Trailer Mounted Generator

The lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for providing, delivering, and testing a portable trailer mounted generator as detailed in the contract specifications. Payment shall be lump sum.

Deductive Bid Schedule C

Bid Item 1 – One (1) Additional Portable Trailer Mounted Generator

The lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for providing, delivering, and testing a portable trailer mounted generator as detailed in the contract specifications. Payment shall be lump sum.

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