CONTRACT DOCUMENTS

CITY OF

WHITE SALMON, WASHINGTON

SCADA UPGRADE PROJECT

2023

anderson perry

Engineering Surveying Natural Resources Cultural Resources GIS

CONTRACT DOCUMENTS

FOR

CITY OF WHITE SALMON, WASHINGTON

SCADA UPGRADE

2023

ANDERSON PERRY & ASSOCIATES, INC.

Walla Walla, Washington
La Grande, Redmond, Hermiston, and Enterprise, Oregon

 Job No. 250-20

TABLE OF CONTENTS

Contract Documents

AGREEMENT

CONTRACT FORMS
Notice of Award
Performance Bond
Payment Bond
Certificate of Insurance
Notice to Proceed
Application for Payment
Work Change Directive
Change Order
Change Proposal
Contractor's Notice of Substantial Completion
Certificate of Substantial Completion
Contractor's Completion Certificate
Notice of Acceptability of Work

SPECIFICATIONS
General Requirements
Technical Specifications

DRAWINGS (BOUND SEPARATELY)

AGREEMENT

AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT OF A SMALL PROJECT

This Agreement is by and between City of White Salmon, Washington ("Owner") and _____ ("Contractor"). Owner and Contractor hereby agree as follows:

ARTICLE 1 - THE WORK

1.01 Work

A. Work includes all labor, materials, equipment, services, and documentation necessary to construct the Project defined herein. The Work may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

B. The Contractor shall complete all Work as specified or indicated in the Contract Documents. The Project is generally described as follows:

1. **SCADA Upgrade 2023** involves updating the Owner's supervisory and data acquisition (SCADA) system by furnishing and installation of two SCADA computer terminals, new human machine interface (HMI) software, installation of Owner furnished programmable logic controllers at 12 locations, and other miscellaneous work required to complete the Project as shown on the Drawings and specified herein. The Work may include alternates to provide the SCADA technical support and maintenance for the Owner over a 3-year period and to furnish new operator interface terminals to replace three existing ones.

2. The Site of the Work includes the Owner's property at several different locations within the City limits and at different water system facilities located outside the City limits. The vicinity location of the Work is summarized on the cover sheet of the Drawings.

ARTICLE 2 - CONTRACT DOCUMENTS

2.01 Intent of Contract Documents

A. It is the intent of the Contract Documents to describe a functionally complete project. The Contract Documents do not indicate or describe all of the Work required to complete the Project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Owner and Engineer. This Agreement supersedes prior negotiations, representations, and agreements, whether written or oral. The Contract Documents are complementary; what is required by one part of the Contract Documents is as binding as if required by other parts of the Contract Documents.

B. During the performance of the Work and until final payment, Contractor and Owner shall submit all matters in question concerning the requirements of the Contract Documents, or relating to the acceptability of the Work under the Contract Documents to the Engineer. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.

C. Engineer will render a written clarification, interpretation, or decision on the issue submitted, or initiate a modification to the Contract Documents.

D. Contractor, and its subcontractors and suppliers, shall not have or acquire any title to or ownership rights to any of the Drawings, Specifications, or other documents (including copies or electronic media editions) prepared by Engineer or its consultants.

2.02 Contract Documents Defined

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to 27, inclusive).
2. Exhibit A - Contractor's Bid Form, Article 5 - Bid Schedule (pages 3-4, inclusive).
3. Exhibit B - Addenda (if applicable) (____ to ____, inclusive).
4. Performance Bond (not attached but incorporated by reference).
5. Payment Bond (not attached but incorporated by reference).
6. Certificate of Insurance (not attached but incorporated by reference).
7. Specifications listed in the Table of Contents (not attached but incorporated by reference).
8. Drawings (not attached but incorporated by reference) consist of Sheets _ to _, inclusive.
9. The following which may be delivered or issued on or after the Effective Date of the Contract:
    a. Notice to Proceed and Application for Payment
    b. Work Change Directives
    c. Change Orders
    d. Contractor's Notice of Substantial Completion
    e. Certificate of Substantial Completion
    f. Contractor's Completion Certificate
    g. Notice of Acceptability of Work

ARTICLE 3 - ENGINEER

3.01 Engineer

A. The Engineer for this Project is Anderson Perry & Associates, Inc. R&W Engineering is the design consulting engineer for the project under subcontract with Anderson Perry and Associates, Inc.

ARTICLE 4 - CONTRACT TIMES

4.01 Contract Times

A. The Work for the SCADA Upgrade 2023 project and Alternate 2 (if selected) will be substantially completed within 210 calendar days when the Contract Times to commence to run, and completed and ready for final payment within 240 calendar days after the date when the Contract Times commence to run. A Notice to Proceed will be given to document commencement of the Contract Times.

4.02 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence in the performance of the Contract, and that Owner will suffer financial and/or other losses if Contractor does not complete the Work according to the requirements of Paragraph 4.01 above, plus any

extensions thereof allowed in accordance with the Contract. Because such losses for delay would be difficult and costly to determine, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner **$2,000.00** for each day that expires after the Contract Time for substantial completion, and **$1,000.00** for each day that expires after the Contract Time for the project completed and ready for final payment.

4.03 Delays in Contractor's Progress

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor or their subcontractors or suppliers.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times.

D. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor or Contractor's subcontractors or suppliers.

4.04 Progress Schedules

A. Contractor shall develop a progress schedule and submit to the Engineer for review and comment before starting Work on the Site. The Contractor shall modify the schedule in accordance with the comments provided by the Engineer.

B. The Contractor shall update and submit the progress schedule to the Engineer each month. The Owner may withhold payment if the Contractor fails to submit the schedule.

ARTICLE 5 - CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

A. For all Work, at the prices stated in Contractor's Bid Form, Article 5 - Bid Schedule, attached hereto as Exhibit A.

B. Before starting construction, the Contractor shall provide the Engineer a preliminary Schedule of Values for all of the Work which includes quantities and prices of times which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis of progress payments during the performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

ARTICLE 6 - BONDS AND INSURANCE

6.01 Bonds

A. Before starting Work, Contractor shall furnish a performance bond and a payment bond from surety companies that are duly licensed or authorized to issue bonds in the required amounts in the jurisdiction in which the Project is located. Each bond shall be in an amount equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until the completion of the correction period specified in Paragraph 7.12 but, in any case, not less than one year after the date when final payment becomes due.

B. Bonds, as required in the Contract Documents, shall be written and signed by an approved surety (or sureties) that is registered with the Washington State Insurance Commissioner, appears on the current Authorized Insurance List in the State of Washington published by the Office of the Insurance Commissioner, and is satisfactory to the Owner.

6.02 Insurance

A. Before starting Work, Contractor shall furnish evidence of insurance from companies that are duly licensed or authorized in the jurisdiction in which the Project is located with a minimum AM Best rating of A-VII or better. Contractor shall provide insurance in accordance with the following:

1. Contractor shall provide coverage for not less than the following amounts, or greater where required by Laws and Regulations:

a. Workers' Compensation:

State:	Statutory
Employer's Liability:	
Bodily Injury, each Accident	$ 1,000,000
Each Employee	$ 1,000,000
Policy Limit	$ 1,000,000

b. Commercial General Liability:

General Aggregate	$ 2,000,000
Products - Completed Operations Aggregate	$ 1,000,000
Personal and Advertising Injury	$ 1,000,000
Each Occurrence (Bodily Injury and Property Damage)	$ 1,000,000

c. Automobile Liability herein:

Bodily Injury:	
Each Person	$ 1,000,000
Each Accident	$ 1,000,000
Property Damage:	
Each Accident	$ 1,000,000

d. Excess or Umbrella Liability:

Per Occurrence	$ 5,000,000
General Aggregate	$ 5,000,000

e. Contractor's Pollution Liability:

Each Occurrence	$
General Aggregate	$

☒ If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

g. Contractor's Professional Liability:

Each Claim	$ 1,000,000
Annual Aggregate	$ 2,000,000

☐ If box is checked, Contractor is not required to provide Contractor's Professional Liability insurance under this Contract

B. All insurance policies required to be purchased and maintained will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to the insured and additional insured.

C. Automobile liability insurance provided by Contractor shall provide coverage against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.

D. Contractor's commercial general liability policy shall be written on a 1996 or later ISO commercial general liability occurrence form and include the following coverages and endorsements:

1. Products and completed operations coverage maintained for three years after final payment;
2. Blanket contractual liability coverage to the extent permitted by law;
3. Broad form property damage coverage; and
4. Severability of interest; underground, explosion, and collapse coverage; personal injury coverage.

E. The Contractor's commercial general liability and automobile liability, umbrella or excess, and pollution liability policies shall include and list Owner and Engineer and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each as additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis.

1. Additional insured endorsements will include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG

20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.

2. Contractor shall provide ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent for design professional additional insureds.

F. Umbrella or excess liability insurance shall be written over the underlying employer's liability, commercial general liability, and automobile liability insurance. Subject to industry-standard exclusions, the coverage afforded shall be procured on a "follow the form" basis as to each of the underlying policies. Contractor may demonstrate to Owner that Contractor has met the combined limits of insurance (underlying policy plus applicable umbrella) specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policies and an umbrella or excess liability policy.

G. The Contractor shall provide property insurance covering physical loss or damage during construction to structures, materials, fixtures, and equipment, including those materials, fixtures, or equipment in storage or transit.

H. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 15.

I. Contractor shall obtain and keep in force the insurance policies that are required in the Contract Documents. The policies shall be with companies or thorough sources approved by the State Insurance Commissioner pursuant to RCW 48.05 and satisfactory to the Owner.

J. Other Additional Insureds: As a supplement to the provisions of Paragraph 6.02.E of the Agreement, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must include as additional insureds (in addition to Owner and Engineer) the following:

1. R&W Engineering Inc, Beaverton Oregon (Engineer's subconsultant)

ARTICLE 7 - CONTRACTOR'S RESPONSIBILITIES

7.01 Supervision and Superintendence

A. Contractor shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, safety, and procedures of construction.

B. Contractor shall assign a competent resident superintendent who is to be present at all times during the execution of the Work. This resident superintendent shall not be replaced without written notice to and approval by the Owner and Engineer except under extraordinary circumstances.

C. Contractor shall at all times maintain good discipline and order at the Site.

D. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Regular working hours will be 10 hours in one day or 40 hours in one week.

E. Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 14.

7.02 Other Work at the Site

A. In addition to and apart from the Work of the Contractor, other work may occur at or adjacent to the Site. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.

7.03 Services, Materials, and Equipment

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work shall be new, of good quality and shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable supplier, except as otherwise may be provided in the Contract Documents.

7.04 Subcontractors and Suppliers

A. Contractor may retain subcontractors and suppliers for the performance of parts of the Work. Such subcontractors and suppliers must be acceptable to Owner.

B. The Contractor shall include the language of this section in each of its first tier subcontracts, and shall require each of its Subcontractors to include the same language of this section in each of their subcontracts, adjusting only as necessary the terms used for the contracting parties. Upon request of the Owner, the Contractor shall promptly provide documentation to the Owner demonstrating that the Subcontractor meets the Subcontractor responsibility criteria below. The requirements of this section apply to all Subcontractors regardless of tier.

C. At the time of subcontract execution, the Contractor shall verify that each of its first tier Subcontractors meets the following Bidder responsibility criteria:

1. Have a current certificate of registration in compliance with Chapter 18.27 RCW, which must have been in effect at the time of subcontract Bid submittal;

2. Have a current Washington Unified Business Identifier (UBI) number;

3. If applicable, have:

a. Have Industrial Insurance (workers' compensation) coverage for the Subcontractor's employees working in Washington, as required in Title 51 RCW;

b. A Washington Employment Security Department number, as required in Title 50 RCW;

c. A Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;

d. An electrical contractor license, if required by Chapter 19.28 RCW;

e. An elevator contractor license, if required by Chapter 70.87 RCW;

4. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065 (3).

7.05 Quality Management

A. Contractor is fully responsible for the managing quality to ensure Work is completed in accordance with the Contract Documents. Refer to the Quality Control section of the General Requirements.

7.06 Licenses, Fees and Permits

A. Contractor shall pay all license fees and royalties and assume all costs incident to performing the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others.

B. Contractor shall obtain and pay for all construction permits and licenses unless otherwise provided in the Contract Documents.

7.07 Laws and Regulations; Taxes

A. Contractor shall give all notices required by and shall comply with all local, state, and federal Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages if Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations.

C. Contractor shall pay all applicable sales, consumer, use, and other similar taxes Contractor is required to pay in accordance with Laws and Regulations.

D. The Contract Price and any agreed variations thereof shall include all taxes imposed by law and properly chargeable to the Project, including sales tax. Sales tax applicable to the Contract Price will be collected from the Owner and shall be paid to the State Department of Revenue by the Contractor in conformance with the law.

E. The Owner will not adjust its payment if the Contractor incorrectly accounted tax liability.

7.08 Record Documents

A. Contractor shall maintain one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings in a safe place at the Site. Contractor shall annotate them to show changes made during construction. Contractor shall deliver these record documents to Engineer upon completion of the Work.

7.09 Safety and Protection

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work.

B. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

1. All persons on the Site or who may be affected by the Work;

2. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. Other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and underground facilities not designated for removal, relocation, or replacement in the course of construction.

C. All damage, injury, or loss to any property caused, directly or indirectly, in whole or in part, by Contractor, or anyone for whose acts the Contractor may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Contract Documents or to the acts or omissions of Owner or Engineer and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor).

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

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

7.10 Shop Drawings, Samples, and Other Submittals

A. Before starting the Work, the Contractor shall provide the Engineer a preliminary Schedule of Submittals, which would include all shop drawings, samples, manufacturer data sheets, etc.

B. Contractor shall review and coordinate the Shop Drawing and samples with the requirements of the Work and the Contract Documents and shall verify all related field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information.

C. Each submittal shall bear a stamp or specific written certification that the Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.

D. With each submittal, Contractor shall give Engineer specific written notice, in a communication separate from the submittal, of any variations that the Shop Drawing or sample may have from the requirements of the Contract Documents.

E. Engineer will provide timely review of Shop Drawings and samples. Submittals will be reviewed and returned to the Contractor, with comments noted thereon, within 15 calendar days following receipt at the Engineer's office.

F. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs.

G. The Engineer's review and approval of a separate item does not indicate approval of the assembly in which the item functions.

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

I. Shop Drawings are not Contract Documents.

7.11 Warranties and Guarantees

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.

7.12 Correction Period

A. If within one year after the date of substantial completion, any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly and without cost to Owner, correct such defective Work.

7.13 Indemnification

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any subcontractor, any supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts they may be liable.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 Owner's Responsibilities

A. Except as otherwise provided in the Contract Documents, Owner shall issue all communications to Contractor through Engineer.

B. Owner shall make payments to Contractor as provided in this Contract.

C. Owner shall provide Site access and easements required to construct the Project.

D. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, unless stated elsewhere in the Contract Documents, Owner shall have sole authority and responsibility for such coordination.

E. The Owner shall retain and pay for the required independent inspection or testing services if Contractor cannot legally provide, as stated by applicable building codes or local building officials, the required independent inspection or testing services called for in the Contract Documents.

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

G. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.

H. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 Engineer's Status

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

B. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Agreement, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any subcontractor, any supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

C. Engineer will make visits to the Site at intervals appropriate to the various stages of construction. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work.

D. Engineer has the authority to reject Work if Contractor fails to perform Work in accordance with the Contract Documents.

E. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work.

F. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

ARTICLE 10 - CHANGES IN THE WORK

10.01 Authority to Change the Work

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work.

10.02 Change Orders

A. Owner and Contractor shall execute appropriate Change Orders covering:

1. Changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;

2. Changes in the Work which are: (a) ordered by Owner or (b) agreed to by the parties or (c) resulting from the Engineer's decision, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

3. Changes in the Contract Price or Contract Times or other changes which embody the substance of any final binding results under Article 12.

B. Work for which the Contractor may claim a price adjustment or extension of time shall require an executed Change Order or Work Change Directive in order to be considered authorized. Work performed by the Contractor without an executed Change Order or Work Change Directive shall constitute acceptance of the Work by the Contractor and shall constitute waiver of any claim for adjustment of the Contract Price or Contract Time as a result of said change.

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

ARTICLE 11 - DIFFERING SUBSURFACE OR PHYSICAL CONDITIONS

11.01 Differing Conditions Process

A. If Contractor believes that any subsurface or physical condition including but not limited to utilities or other underground facilities that are uncovered or revealed at the Site either differs materially from that shown or indicated in the Contract Documents or is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Contract Documents then Contractor shall, promptly (but in no event later than 5 calendar days) after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. After receipt of written notice, Engineer will promptly (but in no event later than 30 calendar days):

1. Review the subsurface or physical condition in question;

2. Determine necessity for Owner obtaining additional exploration or tests with respect to the condition;

3. Determine whether the condition falls within the differing site condition as stated herein;

4. Obtain any pertinent cost or schedule information from Contractor;

5. Prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and

6. Advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

ARTICLE 12 - CLAIMS AND DISPUTE RESOLUTION

12.01 Claims Process

A. The party submitting a claim shall deliver it directly to the other party to the Agreement and the Engineer promptly (but in no event later than 14 days) after the start of the event giving rise thereto. The Claim shall be in sufficient detail to enable the other party to ascertain the basis and the amount of Claim. As a minimum, the following information must accompany any Claim submitted:

1. A detailed factual statement of the Claim providing all necessary dates, locations, items of Work, price adjustments, Contract Time adjustments, and other relevant and key information.

2. The name of each individual, official, or employee involved in or knowledgeable about the Claim.

3. The specific provisions of the Contract which support the Claim and a statement of the reasons why such provisions support the Claim.

4. If the Claim relates to a decision of the Engineer which the Agreement leaves to the Engineer's discretion or as to which the Agreement provides that the Engineer's decision is final, the claimant shall set out in detail all facts supporting its position relating to the decision of the Engineer.

5. The identification of any documents and the substance of any oral communications that support the Claim.

6. If an adjustment of Contract Time is sought:

   a. The specific days and dates for which it is sought.

   b. The specific reasons the claimant believes a time adjustment should be granted.

7. If price adjustment is sought, the exact amount sought shall be outlined in detail.

B. The party receiving a claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the claim through the exchange of information and direct negotiations. All actions taken on a claim shall be stated in writing and submitted to the other party. The Owner may consult the Engineer on the merits of any claim made by the Contractor.

C. If efforts to resolve a claim are not successful, the party receiving the claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the claim within 45 days, the claim is deemed denied.

D. If the dispute is not resolved to the satisfaction of the parties, Owner or Contractor shall give written notice to the other party of the intent to pursue mediation or arbitration as described herein.

E. *Mediation:*

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

F. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the arbitration procedure set forth for final resolution of disputes.

G. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the arbitration procedure set forth for final resolution of disputes.

H. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

I. *Arbitration:*

1. All matters subject to final resolution will be decided by arbitration in accordance with the rules of USA&M Arbitration Service of Seattle, Washington subject to the conditions and limitations of this paragraph. This agreement to arbitrate and any other agreement or consent to arbitrate entered into will be specifically enforceable under the prevailing law of any court having jurisdiction.

2. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitrator or arbitration provider, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the specific time required in this Article, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations. The demand for arbitration should include specific reference to Paragraph 12.01.I.4 below.

3. No arbitration arising out of or relating to the Contract shall include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:

    a. the inclusion of such other individual or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration; and

    b. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings.

4. The award rendered by the arbitrator(s) shall be consistent with the agreement of the parties, in writing, and include a concise breakdown of the award, and a written explanation of the award specifically citing the Contract provisions deemed applicable and relied on in making the award.

5. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.

6. The fees and expenses of the arbitrators and any arbitration service shall be shared equally by Owner and Contractor.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION OF DEFECTIVE WORK

13.01 Tests and Inspections

A. The Contractor shall be responsible for performing all inspections and tests required by applicable codes, those requested by the Owner, and as identified in the "Quality Control" section of the General Requirements.

B. Owner and Engineer will have access to the Site and the Work at reasonable times for their observation, inspection, and testing, if any. Contractor shall provide them proper and safe conditions for such access.

C. Contractor shall give Engineer timely notice of readiness of the Work for all the Owner's required inspections and tests, and shall cooperate with the Owner's personnel to facilitate required inspections and tests.

D. If any Work that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense.

13.02 Defective Work

A. Contractor shall ensure that the Work is not defective.

B. Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. The Contractor shall promptly correct all such defective Work.

E. When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. If the Work is defective or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated.

ARTICLE 14 - PAYMENTS TO CONTRACTOR, COMPLETION, AND CORRECTION PERIOD

14.01 Progress Payments

A. The Contractor shall prepare a schedule of values that will serve as the basis for progress payments. The schedule of values will be in a form of application for payment acceptable to Engineer. The unit price breakdown submitted with the bid will be used for unit price work. The Contractor shall break lump sum items into units that will allow for measurement of Work in progress.

14.02 Applications for Payments

A. Contractor shall submit to Engineer for review a summary of the Work completed to date for which the Contractor is requesting payment. The Contractor's summary shall be accompanied by such supporting documentation as is required by the Contract Documents.

B. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

C. The Engineer will review the summary of Work submitted by the Contractor for which the Contractor is requesting payment. The Engineer will either concur with the Contractor's summary of Work to date or inform the Contractor where the Engineer does not agree with the Contractor's request. In the latter case, the Contractor may make the necessary corrections and resubmit the summary of Work completed to the Engineer.

D. Upon agreement between the Engineer and Contractor on the quantities of Work performed to date, the Engineer will, within 5 days of agreement, prepare the Application for Payment and submit it to the Contractor for Contractor's signature.

E. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

F. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

14.03 Retainage

A. The Owner shall retain 5 percent of each progress payment until the Work is complete and accepted by the Owner.

14.04 Review of Applications

A. Within 5 days after receipt of each application for payment, the Engineer will either indicate in writing a recommendation for payment and present the application for payment to Owner or return the application for payment to Contractor indicating in writing Engineer's reasons

for refusing to recommend payment. The Contractor will make the necessary corrections and resubmit the application for payment.

B. Engineer will recommend reductions in payment (set-offs) which, in the opinion of the Engineer, are necessary to protect Owner from loss because the Work is defective and requires correction or replacement.

C. The Owner is entitled to impose set-offs against payment based on any claims that have been made against Owner on account of Contractor's conduct in the performance of the Work, incurred costs, losses, or damages on account of Contractor's conduct in the performance of the Work, or liquidated damages that have accrued as a result of Contractor's failure to complete the Work.

14.05 Contractor's Warranty of Title

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Agreement will pass to Owner free and clear of (1) all liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than the time of payment by Owner.

B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 14.10. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 14.05.A is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 14.10:

1. Owner shall give Contractor written notice of any defective Work within 14 days of the discovery that such Work is defective; and

2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01, such that any related Claim must be brought within 30 days of the notice.

C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

14.06 Substantial Completion

A. When Contractor considers the entire Work ready for its intended use, Contractor shall notify Owner and Engineer in writing, using the "Contractor's Notice of Substantial Completion" form, that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reason therefor.

C. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, shall be paid by Contractor to

Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this article.

D. If Engineer considers the Work substantially complete, Engineer will prepare a punch list of items to be completed or corrected before final payment. The Engineer will then confer with the Owner to see if the Owner has any objections as to whether the Project is substantially complete or to the accuracy of the attached punch list. If, after considering any objections the Owner may have, the Engineer concludes that the Work is not substantially complete, Engineer will notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If the Owner has no objections, the Engineer will fix the date of Substantial Completion and execute and deliver to Owner and Contractor the Certificate of Substantial Completion with a punch list of items to be completed or corrected.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. When the Work has been completed, the Contractor shall submit to the Engineer the "Contractor's Completion Certificate" form.

14.07 Final Inspection

A. Upon receipt of the "Contractor's Completion Certificate" from Contractor that the entire Work, or an agreed portion thereof, is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.08 Final Payment

A. Contractor may make application for final payment after Contractor has satisfactorily completed all Work defined in the Contract Documents, including providing all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents and other documents.

B. The final application for payment shall be accompanied (except as previously delivered) by:

1. All documentation called for in the Contract Documents;

2. Consent of the surety to final payment;

3. Satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any liens or other title defects, or will so pass upon final payment;

4. A list of all disputes that Contractor believes are unsettled; and

5. Complete and legally effective releases or waivers (satisfactory to Owner) of all lien rights arising out of the Work, and of liens filed in connection with the Work.

C. The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of a Notice of Acceptability of Work.

14.09 Waiver of Claims

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted.

14.10 Correction Period

A. If within one year after the date of Substantial Completion, Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such adjacent areas;
2. correct such defective Work;
3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.

B. Owner shall give any such notice of defect within 14 days of the discovery that such Work or repairs is defective. If such notice is given within such 14 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.

C. If, after receipt of a notice of defect within 14 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01, such that any related Claim must be brought within 30 days of the failure to pay.

E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 Owner May Suspend Work

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 60 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the

Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension.

15.02 Owner May Terminate for Cause

A. Contractor's failure to perform the Work in accordance with the Contract Documents or other failure to comply with a material term of the Contract Documents will constitute a default by Contractor and justify termination for cause.

B. If Contractor defaults in its obligations, then after giving Contractor and any surety ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the Agreement, Owner may proceed to:

1. Declare Contractor to be in default, and give Contractor and any surety notice that the Agreement is terminated; and

2. Enforce the rights available to Owner under any applicable performance bond.

C. Owner may not proceed with termination of the Agreement under Paragraph 15.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

D. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Agreement for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

E. In the case of a termination for cause, if the cost to complete the Work, including related claims, costs, losses, and damages, exceeds the unpaid contract balance, Contractor shall pay the difference to Owner.

15.03 Owner May Terminate for Convenience

A. Upon seven days written notice to Contractor, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Agreement. In such case, Contractor shall be paid for, without duplication of any items:

1. Completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. Expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. Other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

15.04 Contractor May Stop Work or Terminate

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner, and provided Owner does not remedy such

suspension or failure within that time, either stop the Work until payment is received, or terminate the Agreement and recover payment from the Owner.

ARTICLE 16 - CONTRACTOR'S REPRESENTATIONS

16.01 Contractor Representations

A. Contractor makes the following representations when entering into this Agreement:

1. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

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

4. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on:

   a. The cost, progress, and performance of the Work;

   b. The means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and

   c. Contractor's safety precautions and programs.

5. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Agreement.

6. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

7. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

8. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

9. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that, without exception, all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 17 - MISCELLANEOUS

17.01 Cumulative Remedies

A. The duties and obligations imposed by this Agreement and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as

a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Agreement. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.02 Limitation of Damages

A. Neither Owner, Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

17.03 No Waiver

A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Agreement.

17.04 Survival of Obligations

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Agreement, as well as all continuing obligations indicated in the Agreement, will survive final payment, completion, and acceptance of the Work or termination or completion of the Agreement or termination of the services of Contractor.

17.05 Contractor's Certifications

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Agreement.

17.06 Controlling Law

A. This Agreement is to be governed by the law of the state in which the Project is located.

17.07 Prevailing Wage Rates and Hours of Labor

A. During the performance of Work under this Contract, the Contractor must abide by RCW 39.12 in regard to prevailing wages on public works projects and by RCW 49.28 with respect to hours of labor. The State of Washington prevailing wage rates applicable to this public works project, which is located in Klickitat County, may be found at the following website address of the Department of Labor and Industries: https://fortress.wa.gov/lni/wagelookup/prvWagelookup.aspx. Based on the Bid submittal deadline for this Project, the applicable effective date for prevailing wages for this Project is March 2, 2023. A copy of the applicable prevailing wage rates is also available for viewing during regular office hours at the Office of the Engineer, located at Anderson Perry & Associates, Inc., 214 E Birch Street, Walla Walla, Washington 99362, (509) 529-9260. Upon request, the Engineer will mail a hard copy of the applicable prevailing wages for this Project.

B. Contractor shall post the following information in a location readily visible to workers at the job site in conformance with RCW 39.12.020.

1. A copy of a statement of intent to pay prevailing wages approved by the industrial statistician of the State Department of Labor and Industries per RCW 39.12.040.

2. Address and telephone number of the industrial statistician of the State Department of Labor and Industries, where a complaint or inquiry concerning prevailing wages may be made.

C. Per RCW 39.12.040, Contractor shall compile and submit to the Owner with the first Application for Payment a "Statement of Intent to Pay Prevailing Wages", approved by the industrial statistician of the State Board of Industries, for his employees and that for each and every Subcontractor from the Contractor, or a Subcontractor. No payments to the Contractor until an approved Statement of Intent to Pay Prevailing Wages is submitted to the Owner. The Statement of Intent to Pay Prevailing Wages shall include the following.

1. Contractor's registration certification number.
2. Prevailing rate of wage for each classification of workers entitled to prevailing wages under RCW 39.12.020 and the estimated number of workers in each classification.

D. With the final Application for Payment, Contractor shall provide the following documentation, along with other documentation required by the Contract Documents.

1. A release obtained from the Washington State Department of Revenue.
2. Affidavits of Wages Paid forms (from the State Department of Labor and Industries) for the Contractor and all Subcontractors are on file with the Owner (RCW 39.12.040).
3. Release has been obtained from the Washington State Department of Labor and Industries for payment of unemployment compensation and the Washington State Employment Security Department for payment of industrial insurance and medical aid.
4. A certificate of Payment of Contributions Penalties and Interest on Public Works Contract is received from the Washington State Employment Security Department.
5. The Owner will not release final payment, including retainage, until the above documentation is received and all Claims, as provided by law, against the retainage have been resolved. In the event Claims are filed and provided the above conditions 1, 2, and 3 are met, the Contractor will be paid such retained percentage less an amount sufficient to pay any such Claims together with a sum determined by the Owner sufficient to pay the cost of foreclosing on Claims and to cover attorney's fees.

E. Contractor shall be responsible for requesting the "Intent to Pay Prevailing Wages" and "Affidavit of Wages Paid" forms from the State Department of Labor and Industries and for paying any approval fees required by the State Department of Labor and Industries.

F. Any disputes that arise as to what the prevailing wage rates of wages for work of a similar nature and such dispute cannot be adjusted by the parties in interest, including labor and management representatives, the matter shall be referred for arbitration to the Director of the State Department of Labor and Industries and his or her decision therein shall be final and conclusive and binding on all parties involved in the dispute.

17.08 Definitions and Terminology

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term’s singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. Addenda—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. Agreement—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

3. Application for Payment—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. Bid—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

5. Bidder—An individual or entity that submits a Bid to Owner.

6. Bidding Documents—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. Bidding Requirements—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

8. Change Order—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.

9. Change Proposal—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. Claim—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.

11. Contract—The entire and integrated written contract between the Owner and Contractor concerning the Work.

12. Contract Documents—Those items so designated in the Agreement, and which together comprise the Contract.

13. Contract Price—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .

14. Contract Times—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

15. Contractor—The individual or entity with which Owner has contracted for performance of the Work.
16. Control System Integrator – The party who furnishes all control components, configures the control system and provides all programming and documentation, designs the detailed control wiring diagrams plus the layout and assembly of the custom control panels.
17. Drawings—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor. This term also includes and refers to the term "Figures".
18. Effective Date of the Contract—The date, indicated in the Agreement, on which the Contract becomes effective.
19. Engineer—The individual or entity named as such in the Agreement.
20. Laws and Regulations; Laws or Regulations—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
21. Liens—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
22. Notice of Award—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
23. Notice to Proceed—A written notice by Owner to Contractor fixing the date on which Contractor shall start to perform the Work.
24. Owner—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
25. Progress Schedule—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
26. Project—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
27. Project Manual—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
28. Samples—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
29. Schedule of Submittals—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.

30. Schedule of Values—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

31. Shop Drawings—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

32. Site—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.

33. Specifications—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

34. Subcontractor—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.

35. Substantial Completion—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

36. Successful Bidder—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.

37. Supplier—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.

38. SCADA – Supervisory Control and Data Acquisition

39. Underground Facilities—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

40. Unit Price Work—Work to be paid for on the basis of unit prices.

41. Work—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

42. Work Change Directive—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on _____ (which is the Effective Date of the Agreement).

OWNER:	CONTRACTOR:
City of White Salmon, Washington	
By:	By:
Title:	Title:
	(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)
Attest:	Attest:
Title:	Title:
Address for giving notices:	Address for giving notices:
	License No.: (where applicable)

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Contract.)

Exhibit A

Contractor's Bid Form, Article 5 - Bid Schedule

Exhibit B

Addenda *(if issued)*

CONTRACT FORMS

NOTICE OF AWARD

Date of Issuance:

Owner: **City of White Salmon, Washington**

Engineer: **Anderson Perry & Associates, Inc.**

Project: **SCADA Upgrade 2023**

Bidder:

Bidder's Address:

You are notified that Owner has accepted your Bid dated **_____** for the above Contract, and that you are the Successful Bidder and are awarded a Contract for: _____

The Contract Price of the awarded Contract is $_____. Contract Price is subject to adjustment based on the provisions of the Contract including, but not limited to, those governing changes and Unit Price Work, as applicable.

You must comply with the following conditions within 15 days of the date you receive this Notice of Award:

1. Notice of Award

Acknowledge acceptance of the Project award in the space provided on this Notice of Award form. Be sure to include the date, as well as the signature and title of the person signing the Award form. ***Return all 3 copies to the Engineer.***

2. Agreement Between Owner and Contractor

Date and sign all ***3*** copies of the attached Agreement form. ***Return all 3 copies*** to the Engineer.

3. Payment and Performance Bonds

Provide the Construction Performance and Payment Bonds. Enclosed are ***3*** copies of the Payment Bond and ***3*** copies of the Performance Bond forms. Include an appropriate Power of Attorney which is properly dated with each of the bonds. **Additionally, note that the date shown on the Payment and Performance Bonds must be on or after the date shown on the Agreement.** The date on the Power of Attorney should be the same as shown on the Bond. These Payment and Performance Bond forms must be used, and no others will be accepted. Return ***3*** completed copies to the Engineer.

4. Certificate of Insurance

Complete the enclosed Certificate of Insurance form. The enclosed Certificate of Insurance form is the only acceptable form to be used for this project. Standard ACORD forms from the insurance company will be required to be attached to this form. Be sure to include Worker's Compensation certificates. Return all ***3*** copies to the Engineer.

5. Other Requirements

Schedule of Values for any lump sum bid prices greater than $5,000 and Progress Schedule shall be submitted to the Engineer at the Pre-Construction Conference.

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

Within 20 days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement and Contract Documents.

Owner: **City of White Salmon, Washington**

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged this _____ day of _____, 20__, by:

Contractor:

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

Copy to Owner

PERFORMANCE BOND

Contractor Name: **[Full formal name of Contractor]** Address *(principal place of business)*: **[Address of Contractor's principal place of business]**	**Surety** Name: Address *(principal place of business)*:
Owner Name: **City of White Salmon, Washington** Mailing address *(principal place of business)*: **P.O. Box 2139/100 N. Main Street** **White Salmon, Washington 98672**	**Contract** Description *(name and location)*: **SCADA Upgrade** **White Salmon, Washington** Contract Price: **[Amount from Contract]** Effective Date of Contract: **[Date from Contract]**

Bond

Bond Amount:

Date of Bond:

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ See Paragraph 16

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

Contractor as Principal	Surety
_____ *(Full formal name of Contractor)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature)(Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.

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

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:

    3.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;

    3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

    3.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

    5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

    5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

    5.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

    5.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

   7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

   7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

   7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

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

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

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

12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such

statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

14. Definitions

    14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

    14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

    14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

    14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

    14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

16. Modifications to this Bond are as follows: **[Describe modification or enter "None"]**

PAYMENT BOND

Contractor	**Surety**
Name: **[Full formal name of Contractor]** Address *(principal place of business)*: **[Address of Contractor's principal place of business]**	Name: Address *(principal place of business)*:
Owner	**Contract**
Name: **City of White Salmon, Washington** Mailing address *(principal place of business)*: **P.O. Box 2139/100 N. Main Street** **White Salmon, Washington 98672**	Description *(name and location)*: **SCADA Upgrade** **White Salmon, Washington** Contract Price: **[Amount, from Contract]** Effective Date of Contract: **[Date, from Contract]**

Bond

Bond Amount:

Date of Bond:

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ See Paragraph 18

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

Contractor as Principal	Surety
_____ *(Full formal name of Contractor)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature)(Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond will arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.

4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.

5. The Surety's obligations to a Claimant under this Bond will arise after the following:

    5.1. Claimants who do not have a direct contract with the Contractor

        5.1.1. have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

        5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 13).

    5.2. Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).

6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.

7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

    7.1. Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

    7.2. Pay or arrange for payment of any undisputed amounts.

    7.3. The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 will not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

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

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

12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.

14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

    16.1. *Claim*—A written statement by the Claimant including at a minimum:

        16.1.1. The name of the Claimant;

        16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;

        16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;

        16.1.4. A brief description of the labor, materials, or equipment furnished;

16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;

16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;

16.1.7. The total amount of previous payments received by the Claimant; and

16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

18. Modifications to this Bond are as follows: **[Describe modification or enter "None"]**

CERTIFICATE OF INSURANCE

Owner: **City of White Salmon, Washington**

Contractor:

Engineer: **Anderson Perry & Associates, Inc.**

Project: **SCADA Upgrade**

The Name and Address of Insurers on this Project:

_____

_____

_____

The Contractor certifies that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract.

Attached to this Certificate are the following:

_X_ Standard ACORD Form

_X_ Listing of Additional Insureds

___ Other: _____

All policies contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 30 days' prior written notice has been given to Contractor. Within 3 days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.

Name of Insurance Company(s)		Insurance Agency	
Signature of Authorized Insurance Agency Representative	Date	Signature of Contractor	Date
Printed Name		Printed Name	
Title		Title	

NOTICE TO PROCEED

Owner:	**City of White Salmon, Washington**
Engineer:	**Anderson Perry & Associates, Inc.**
Contractor:	
Project:	**SCADA Upgrade**
Effective Date of Contract:	

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [date Contract Times are to start] pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

In accordance with the Agreement:

> The date by which Substantial Completion must be achieved is [date for Substantial Completion, from Agreement], and the date by which readiness for final payment must be achieved is [date for readiness, from Agreement].

Before starting any Work at the Site, Contractor must comply with the following:

> **[Note any access limitations, security procedures, or other restrictions]**

The Contractor is required to return [number] signed copies of this Notice to Proceed to the Engineer within 10 days of the issue date.

Owner:	**City of White Salmon, Washington**	Accepted: Contractor:	**[Full formal name of Contractor]**
By *(signature)*:		By *(signature)*:	
Name *(printed)*:		Name *(printed)*:	
Title:		Title:	
Date Issued:			

Copy: Engineer

APPLICATION FOR PAYMENT NO. __
CITY OF WHITE SALMON, WASHINGTON
SCADA UPGRADE 2023

TO **City of White Salmon, Washington** (OWNER)

FROM _____ (CONTRACTOR)

For Work accomplished through the date of: _____

1.	Original Contract Price	
2.	Net Change by Change Orders and Written Amendments (+/-)	$ -
3.	Current Contract Price (1 plus 2)	$ -
4.	Total Work Completed and Materials On Hand to Date*	$ -
5.	Retainage: 5%	$ -
6.	Sales Tax: 7.5%	$ -
7.	Liquidated Damages	($ -)
8.	Less Previous Application for Payments	$ -
9.	**DUE THIS APPLICATION (4 minus 5, plus 6, minus 7 and 8)**	**$ -**

**** Line 4 may not match Line 3 on final Application for Payment due to bid versus constructed quantity differences on unit price work.***

Accompanying Documentation:

Contractor's Certification:

The undersigned Contractor certifies that (1) all previous progress payments received from Owner, if any, on account of Work done under the Contract referred to above have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Application; (2) title of all Work, materials, and equipment incorporated in said Work or otherwise listed in, or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests, and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Lien, security interest, or encumbrance); (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and not defective; and (4) Record Drawings and required job photos are up-to-date, accurate, and complete for Work performed.

Dated _____ _____
CONTRACTOR

By: _____

Payment of the above AMOUNT DUE THIS APPLICATION is recommended

Dated _____ **Anderson Perry & Associates, Inc.**
ENGINEER

By: _____

APPROVED by Owner: **City of White Salmon, Washington**
OWNER

Dated _____ By: _____

Title: _____

APPLICATION FOR PAYMENT NO. __
CITY OF WHITE SALMON, WASHINGTON
SCADA UPGRADE 2023

Date:

FROM:

TO: **City of White Salmon, Washington**

Date of Completion	Contract Amount		Date of Estimate
Original:	Original Amount of Contract:		From:
Revised:	Change Orders: (+ or -)	$ -	To:
On Schedule: ☐ Yes ☐ No	Current Contract Amount	$ -	

Item No.	CONTRACT ITEMS Description	BID PRICES Qty.	Unit	Unit Price	PREVIOUS Qty.	PREVIOUS Amount	THIS PERIOD Qty.	THIS PERIOD Amount	TOTAL TO DATE Qty.	TOTAL TO DATE Amount
					0%	$0.00	0%	$0.00	0%	$0.00
					0%	0.00	0%	0.00	0%	0.00
					0%	0.00	0%	0.00	0%	0.00
					0%	0.00	0%	0.00	0%	0.00
					0%	0.00	0%	0.00	0%	0.00
					0%	0.00	0%	0.00	0%	0.00
				Total Bid Items	**$**	**0.00**	**$**	**0.00**	**$**	**0.00**

APPLICATION FOR PAYMENT NO. __
CITY OF WHITE SALMON, WASHINGTON
SCADA UPGRADE 2023

Date:

Change Orders:	Qty.	Unit	Unit Price	PREVIOUS		THIS PERIOD		TOTAL TO DATE	
				Qty.	Amount	Qty.	Amount	Qty.	Amount
			Total All Change Orders		$ 0.00		$ 0.00		$ 0.00

Materials on Hand:	Qty.	Unit	Unit Price	PREVIOUS		THIS PERIOD		TOTAL TO DATE	
				Qty.	Amount	Qty.	Amount	Qty.	Amount
			Total Materials on Hand		$ 0.00		$ 0.00		$ 0.00
			TOTAL WORK COMPLETED AND MATERIALS ON HAND		$ 0.00		$ 0.00		$ 0.00

SUMMARY

	PREVIOUS	THIS PERIOD	TOTAL TO DATE
1. Amount Earned	$ 0.00	$ 0.00	$ 0.00
2. Amount Retained (5%)	$ 0.00	$ 0.00	$ 0.00
3. Sales Tax (7.5%)	$ 0.00	$ 0.00	$ 0.00
4. Liquidated Damages	$ 0.00	$ 0.00	$ 0.00
Amount Due for Payment	$ 0.00	$ 0.00	$ 0.00
Amount Due for Payment this Estimate		$ 0.00	
Estimated % Job Completed:	#DIV/0!		

WORK CHANGE DIRECTIVE NO.: [Number of Work Change Directive]

Owner:
Engineer: **Anderson Perry & Associates, Inc.**
Contractor:
Project: **SCADA Upgrade**

Date Issued: Effective Date of Work Change Directive:

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

Description:

Attachments:

Purpose for the Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

Notes to User—Check one or both of the following

☐ Non-agreement on pricing of proposed change. ☐ Necessity to proceed for schedule or other reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price: $ _____ **[increase] [decrease] [not yet estimated]**.

Contract Time: _____ days **[increase] [decrease] [not yet estimated]**.

Basis of estimated change in Contract Price:

☐ Lump Sum ☐ Unit Price ☐ Cost of the Work ☐ Other

	Recommended by Engineer	Authorized by Owner
By:		
Printed Name:		
Title:		
Date:		

CHANGE ORDER

Change Order No.: _____

Date of Issuance:

Owner: **City of White Salmon, Washington**

Contractor:

Engineer: **Anderson Perry & Associates, Inc.**

Project: **SCADA Upgrade 2023**

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

Description of Changes (Supplemental description, Plans and Specifications attached, as applicable)	DECREASE in Contract Price	INCREASE in Contract Price
Subtotal	$0.00	$0.00
Total, Increase Less Decrease	$0.00	
Sales Tax (x.x%), if applicable	$0.00	
Net Change in Contract Price for this Change Order	$0.00	

JUSTIFICATION:

The amount of the Contract will be (Decreased) (Increased) (Unchanged) for this Change Order by the sum of: $0.00

Total Contract Price prior to this Change Order: _____

The Contract Price incorporating this Change Order: $0.00

Contract Times prior to this Change Order:

Date of Substantial Completion: _____

Date Ready for Final Payment: _____

The Contract period provided for Substantial Completion will be (Increased) (Decreased) (Unchanged). _____ days

Revised Date of Substantial Completion: _____

Revised Date Ready for Final Payment: _____

RECOMMENDED:

By: _____
Engineer (if required)

Name: _____

Title: _____

Date: _____

ACCEPTED:

By: _____
Owner (Authorized Signature)

Name: _____

Title: _____

Date: _____

ACCEPTED:

By: _____
Contractor (Authorized Signature)

Name: _____

Title: _____

Date: _____

Approved by Agency (if applicable)

By: _____

Name: _____

Title: _____

Date: _____

CHANGE PROPOSAL

(To Be Completed by the Contractor When Requesting a Change Order [see 11.09 of the General Conditions])

Project: **City of White Salmon, Washington - SCADA Upgrade 2023**

Contractor: _____

Proposed Change Order No.: _____ **Date:** _____

By: _____ **Printed Name and Title:** _____

Contractor (Authorized Signature)

Date received by Engineer: _____

Received by: _____

(Print Name)

Change Order Description: _____

Justification: (Provide detailed description):

Labor: (Provide detailed breakdown of all labor cost, i.e., hours, rates, and classification):

Subtotal, Labor: _____

15.00% Contractor's Fee (Overhead and Profit, see Section 11.07.C of the General Conditions), Labor: $ -

Equipment: (Provide detailed breakdown of all equipment cost, i.e., hours, rates, and classification):

Subtotal, Equipment: _____

0.00% Contractor's Fee (Overhead and Profit), Equipment: $ -

Materials: (Provide detailed breakdown of all materials associated with this Change Order):

Subtotal, Materials:

15.00% Contractor's Fee (Overhead and Profit), Materials: $ -

Subcontract Cost: (Attach this form for all subcontract work associated with this Change Order Item):

Subtotal, Subcontract Cost:

5.00% Contractor's Fee (Overhead and Profit), Subcontract: $ -

Other: (Provide detailed description):

Subtotal, Other:

Contractor's Fee (Overhead and Profit), Other: $ -

TOTAL ESTIMATED COST OF PROPOSED CHANGE ORDER: $ -

UNIT PRICE (If applicable):

Proposed Contract Time Change Associated with this Change Order:

____ Days. (*Provide Justification and Description*):

CONTRACTOR'S NOTICE OF SUBSTANTIAL COMPLETION

(Contractor)_____ hereby notifies the Engineer that construction Work on the Project **City of White Salmon, Washington - SCADA Upgrade 2023** has been substantially completed in accordance with all requirements of the Project Contract Documents. The Contractor also verifies that Operation and Maintenance Manuals and Record Drawings, as required by the Contract, have been submitted to the Engineer, and all system components have been properly installed, serviced, and lubricated where appropriate, and checked and tested for proper operation, all as recommended by the product manufacturer and as required by the Contract Documents. The Contractor further states that proper training has been given to the Owner's designated representative as to proper operation and service of the Project system and components.

The Contractor requests the Engineer issue a Certificate of Substantial Completion. The attached draft punch list prepared by the Contractor lists items that need to be completed or corrected.

By: _____
(Authorized Signature)

_____
(Name)

_____
(Title)

_____
(Date)

(All items below the dotted line shall be completed by the Engineer.)

Review by Engineer:

☐ An inspection is scheduled for _____ to determine the status of completion.
(Date and Time)

☐ Construction Work was found not to be substantially complete. The Contractor shall complete the necessary Work and resubmit a new "Contractor's Notice of Substantial Completion."

By: _____
(Authorized Signature)

_____
(Name)

_____
(Title)

_____
(Date)

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	**City of White Salmon, Washington**
Engineer:	**Anderson Perry & Associates, Inc.**
Contractor:	
Project:	**SCADA Upgrade 2023**

This ☐ Preliminary ☐ Final Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

Date of Substantial Completion:

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

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

Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work must be as provided in the Contract, except as amended as follows:

Amendments to Owner's Responsibilities: ☐ None ☐ As follows:

Amendments to Contractor's Responsibilities: ☐ None ☐ As follows:

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

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

Executed by Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

Received by Owner

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

Received by Contractor

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

CONTRACTOR'S COMPLETION CERTIFICATE

(Contractor)_____ hereby certifies that the Contract known as **City of White Salmon, Washington - SCADA Upgrade 2023** has been completed in accordance with all requirements of the Project Contract Documents and is ready for final payment. The Contractor further states that information contained in the Record Drawings and Operation and Maintenance Manual is complete, accurate, and properly describes equipment, materials, and system installed as a part of the Work. The Contractor further states that all information required by the Contract Documents has been submitted to the Engineer. The Contractor also certifies that all title and lien issues have been resolved and that full title to all Work, materials, and equipment has passed to the Owner free and clear of any liens or other title defects, or will so pass upon final payment, including materialmen and mechanics liens.

_____
Contractor (Authorized Signature)

_____
(Name)

_____
(Title)

_____
(Date)

(All items below the dotted line shall be completed by the Engineer.)

Review by Engineer:

☐ The Work appears to be complete and a final inspection is scheduled for _____.
(Date and Time)

☐ The Work was found not to be complete. The Contractor shall complete the necessary Work and resubmit a new "Contractor's Completion Certificate."

By: _____
Engineer (Authorized Signature)

_____
(Name)

_____
(Title)

_____
(Date)

Instructions: This form shall be completed by the Contractor when all Work is complete and the Project is ready for final payment.

NOTICE OF ACCEPTABILITY OF WORK

Owner:	**City of White Salmon, Washington**
Engineer:	**Anderson Perry & Associates, Inc.**
Contractor:	
Project:	**SCADA Upgrade 2023**

Date Project is Ready for Final Payment

The Engineer hereby gives notice to the Owner and Contractor that Engineer recommends final payment to Contractor subject to the provisions of 15.07 of the General Conditions, and, to the best knowledge and belief of the Engineer, that the Work furnished and performed by Contractor under the Construction Contract is acceptable, expressly subject to the provisions of the Construction Contract's Contract Documents ("Contract Documents") and of the Agreement between Owner and Engineer for Professional Services dated **[date of professional services agreement]** ("Owner-Engineer Agreement"). This Notice of Acceptability of Work (Notice) is made expressly subject to the following terms and conditions to which all who receive and rely on said Notice agree:

1. This Notice has been prepared with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.

2. This Notice reflects and is an expression of the Engineer's professional opinion.

3. This Notice has been prepared to the best of Engineer's knowledge, information, and belief as of the Notice Date.

4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor's Work) under the Owner-Engineer Agreement, and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Owner-Engineer Agreement.

5. This Notice is not a guarantee or warranty of Contractor's performance under the Construction Contract, an acceptance of Work that is not in accordance with the Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Contract Documents, or to otherwise comply with the Contract Documents or the terms of any special guarantees specified therein.

6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract, and is subject to Owner's reservations of rights with respect to completion and final payment.

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

Date: _____

The Owner hereby accepts the Work on the above-referenced Project and concurs the Project is ready for final payment.

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

Date: _____

cc: Contractor

SPECIFICATIONS

TABLE OF CONTENTS

Specifications

General Requirements

Technical Specifications

GENERAL REQUIREMENTS

GENERAL REQUIREMENTS

TABLE OF CONTENTS

Page GR-

A. Summary of Work 1
B. Special Project Requirements 1
C. Owner Furnished Equipment and Materials 2
D. Abbreviations 3
E. Other Work at the Site 5
F. Project Work Meetings 6
G. Easements, Permits, and Licenses 7
H. Mobilization/Demobilization 7
I. Project Safety 7
J. Shop Drawings and Submittals 8
K. Quality Control 10
L. Cooperation with Others 11
M. Progress of the Work - Cleanup 11
N. Existing Equipment Removal and Salvage 11
O. Partial Utilization of Project Components 12
P. Startup and Training 12
Q. Record Drawings 12
R. Operation and Maintenance Documents 13

GENERAL REQUIREMENTS

A. SUMMARY OF WORK

The Work for this Contract involves updating the Owner's supervisory and data acquisition (SCADA) system by furnishing and installation of two SCADA computer terminals, new human machine interface (HMI) software, installation of Owner furnished programmable logic controllers at 12 locations, and other miscellaneous work required to complete the Project as shown on the Drawings and specified herein. The Work may include alternates to provide the SCADA technical support and maintenance for the Owner over a 3-year period and to furnish new operator interface terminals to replace three existing ones.

B. SPECIAL PROJECT REQUIREMENTS

The Contractor's Work and construction schedule shall include the following project requirements and considerations.

1. The City's SCADA system consists of three distinct zones or segments, No. 1, 2, and 3 and are shown on Sheet G-001 of the Drawings. The Owner is in the process of or planning to upgrade the communication system in each segment. Refer to "Other Work at the Site" paragraph of the General Requirements for additional details on this other work.

2. The installation of the proposed SCADA improvements will require communication and system control at each site to be temporarily shut down while the new equipment is being installed. To keep each site functional during system installation, the Owner intends to use its staff to monitor and operate the system manually (if needed), to meet the needs of its water and wastewater customers.

    a. Coordinate Work with the Engineer and Owner in advance as required in Technical Specifications, "Section 26 00 10 – Supplemental Requirements for Electrical".

    b. Once work is started on a site, diligently pursue and finish the completion of the Work at the site in a timely manner to minimize the communication and operational downtime at the site.

    c. The Grand Ronde Booster Pump Station site is a critical segment of the Owner's water system and can only be taken out of operation for relatively short durations during winter and fall months depending on customer water demand and water production from the Owner's Buck Creek WTP. January-February is likely the best time frame depending on the amount of rainfall during those months.

    d. The Owner's wastewater lift stations (Heritage Plaza and Waubish) are not currently connected to the Owner's existing SCADA system. Work at these stations could proceed prior to the new SCADA workstations being deployed.

Work at these stations would need to be coordinated with the Engineer and Owner and the functionality of these stations (at least in manual mode) would need to be maintained for the Work's duration.

3. Special Events in White Salmon

Coordinate the scheduling and completion of the Work to avoid disrupting, impeding, and creating limitations for the following special events in White Salmon, which typically involve the downtown area of Jewett Boulevard/SR 141.

a. Spring Fest, 1st weekend in June

b. Wine, Art and Fusion, last Saturday in July

c. 4th of July Parade, on July 4th

d. Halloween Event, on October 31st

4. Qualifications and Experience of Contractor

a. The Contractor shall employ or subcontract the services of a Control System Integrator that has successfully designed, programmed, constructed, and/or commissioned at least two SCADA systems for municipal water or wastewater systems using the specified manufacturer instruments and devices in the last ten years.

b. System Designer shall have a minimum of five years of experience in the design, programming, construction, and/or commissioning of SCADA systems for municipal water or wastewater systems.

c. The Control Systems Integrator shall be an instrument and control system assembling company with their own panel shop.

d. The Control Systems Integrator's support office shall be located within a 200-mile drive from White Salmon, Washington.

C. OWNER FURNISHED EQUIPMENT AND MATERIALS

1. The Owner is furnishing the following equipment and materials shown in Table 1 for inclusion in the Work. This equipment and materials were purchased from Columbia Electric Supply, Vancouver, Washington.

TABLE 1
SUMMARY OF OWNER FURNISHED EQUIPMENT AND MATERIALS

Quantity	Product Code	Description
12	AB 1766-L32BWAA	32 DC In/Rely MO
8	SPECN 1762SC-IFSU	8 Ch Univ Analog Input Module
2	AB 1762-IQ16	16 Pt DC Input
1	AB 1762-OW16	16 Pt Rly Output

2. Prior to transfer of the furnished equipment and materials to the Contractor, the Contractor and Owner will jointly inspect the condition of each piece of equipment and materials at the Owner's Public Works Shop. All damages to the materials shall be noted and immediately reported to the Engineer.

3. The Contractor and/or Owner shall record in writing the transfer of the Owner furnished equipment and materials to the Contractor's care and give a copy of the written record to the Engineer.

4. Transport all Owner furnished equipment and materials to its storage facility and/or the Sites.

5. Following transfer and until final acceptance of the Project, provide protection of and insurance on equipment and materials where installed or placed in storage at the Sites, in accordance with the manufacturer's printed instructions. The method of storage and protection shall accommodate inspection, and the Engineer shall have access to the Contractor's on-site and/or off-site storage facilities for the purpose of inspection. If the equipment and materials are stored off-site, then insurance for this off-site storage shall be provided and the Engineer or Owner shall review the storage facilities for security and suitability.

6. Replace Owner furnished equipment and materials that are lost or damaged after transfer to the Contractor, or at the Engineer's option, be back charged for repairs or replacements. The Contractor shall be charged for Owner's furnished equipment and materials that is not used in the Work and is not returned to the Owner.

7. Warranties on Owner furnished equipment and materials will be both others except when defect is directly attributable to negligence or improper handling, storage, or installation pursuant to the manufacturer's instructions, on part of the Contractor.

D. ABBREVIATIONS

The following abbreviations of Associations, units of measurement, and miscellaneous items are defined as they may be used in these Contract Documents or on the Drawings. This list may not be all-inclusive.

GENERAL REQUIREMENTS

Associations

AASHTO	-	American Association of State Highway and Transportation Officials	CRSI	-	Concrete Reinforcing Steel Institute
ACI	-	American Concrete Institute	DFPA	-	Douglas Fir Plywood Association
AGC	-	Associated General Contractors of America	DIPRA	-	Ductile Iron Pipe Research Association
AIA	-	American Institute of Architects	IBC	-	International Building Code
AISC	-	American Institute of Steel Construction	ICEA	-	Insulated Cable Engineers Association
AISI	-	American Iron and Steel Institute	IEEE	-	Institute of Electrical and Electronics Engineers
AITC	-	American Institute of Timber Construction	IPC	-	International Plumbing Code
ANSI	-	American National Standards Institute	IPCEA	-	Insulated Power Cable Engineers Association
APA	-	American Plywood Association	ITE	-	Institute of Transportation Engineers
APWA	-	American Public Works Association	NEMA	-	National Electrical Manufacturer's Association
AREA	-	American Railway Engineering Association	NFPA	-	National Fire Protection Association
ASCE	-	American Society of Civil Engineers	SAE	-	Society of Automotive Engineers
ASME	-	American Society of Mechanical Engineers	SDI	-	Steel Door Institute
ASTM	-	American Society for Testing and Materials	SSPC	-	Steel Structures Painting Council

Associations (cont.)

AWS	-	American Welding Society	WWPA	-	Western Wood Products Association
AWWA	-	American Water Works Association			

Codes and Acts

MUTCD	-	Manual on Uniform Traffic Control Devices	RCW	-	Revised Code of Washington (Laws of the State)
NEC	-	National Electrical Code	SEPA	-	State Environmental Policy Act
NEPA	-	National Environmental Policy Act	UL	-	Underwriters Laboratories, Inc.
OAR	-	Oregon Administrative Rules	WAC	-	Washington Administrative Code

Federal Agencies

BIA	-	Bureau of Indian Affairs	NRCS	-	Natural Resources Conservation Service
BLM	-	Bureau of Land Management	OSHA	-	Occupational Safety and Health Administration
BOR	-	Bureau of Reclamation	USDA	-	U.S. Department of Agriculture
DOD	-	Department of Defense	USEPA	-	U.S. Environmental Protection Agency
FHWA	-	Federal Highway Administration	USFS	-	U.S. Forest Service
LCDC	-	Land Conservation and Development Commission	USFWS	-	U.S. Fish and Wildlife Service
NMFS	-	National Marine Fisheries Service			

State Agencies

WISHA	-	Washington Industrial Safety and Health Administration	WSDOT	-	Washington State Department of Transportation

Units of Measurement and Abbreviation (Partial Listing)

AC	-	Asbestos Cement or Asphalt Concrete	L	-	Liter
ACP	-	Asphalt Concrete Pavement	Lb.	-	Pound(s)
BST	-	Bituminous Surface Treatment	L.F. or Lin. Ft.	-	Linear Foot (Feet)
CDR	-	Controlled Density Fill	LS or L.S.	-	Lump Sum
C.I.	-	Cast Iron	Max.	-	Maximum
CL	-	Centerline	MH	-	Manhole
C.O.	-	Clean Out	MJ	-	Mechanical Joint
Cl.	-	Class	Min.	-	Minimum

cfm	-	Cubic Feet Per Minute	MPH	-	Miles Per Hour
Conc.	-	Concrete	NBR	-	Nitrile Butadiene Rubber
Culv.	-	Culvert	N.T.S.	-	Not to Scale
CY, C.Y., or Cu. Yd.	-	Cubic Yard(s)	O.C.	-	On Center
			O.D.	-	Outside Diameter
DI	-	Ductile Iron	PL	-	Plate
Dia.	-	Diameter	PVC	-	Polyvinyl Chloride
Ea.	-	Each	psi	-	Pounds Per Square Inch
Elev., EL, or El.	-	Elevation	Q	-	Flow Rate
Est.	-	Estimate or Estimated	R	-	Radius
Extg.	-	Existing	REQD.	-	Required
F	-	Fahrenheit	RPM	-	Revolutions Per Minute
F.F.	-	Finished Floor	R/W	-	Right-of-Way

Units of Measurement and Abbreviation
(Partial Listing, cont.)

FLG	-	Flange	SS	-	Sanitary Sewer
Fpc	-	Specified Tensile Strength of Prestressed Tendon.	SBR	-	Styrene Butadiene Rubber
			SCH	-	Schedule
fps	-	Feet Per Second	SD	-	Storm Drain
Ft.	-	Foot or Feet	SF, S.F., or Sq. Ft.	-	Square Foot
gpm	-	Gallons Per Minute	Sht.	-	Sheet
HDPE	-	High Density Polyethylene	Stl.	-	Steel
HMAC	-	Hot-Mix Asphalt Concrete	SWL	-	Static Water Level
Hp	-	Horsepower	SY, S.Y., or Sq. Yd.	-	Square Yard
I.D.	-	Inside Diameter	TDH	-	Total Dynamic Head
I/I	-	Infiltration/Inflow	TM	-	Test Method
In.	-	Inch or Inches	Typ.	-	Typical
Incl.	-	Including	W	-	Water
Inv. El.	-	Invert Elevation			
Irr	-	Irrigation			

E. OTHER WORK AT THE SITE

1. The Owner currently has another contractor installing a new transmission main and fiber optic casing/cable in Buck Creek Road which is the primary access road to the Buck Creek Water Treatment Plant (WTP). Once completed, the new fiber optic casing/cable will connect the Buck Creek WTP and the Buck Creek Monitoring Station (MS). Final completion of the new fiber optic casing/cable line is anticipated in July/August 2024. The Contractor will need to coordinate his work with the Owner to provide access to and suitable time for installing the Work at the Buck Creek WTP. The Owner depends on the Buck Creek WTP to provide water during the high-water demand months during the summer and the WTP needs to remain in service (at least in manual mode) during the high demand period.

2. With assistance from its Information Technology (IT) provider (Radcomp Technologies, White Salmon, WA), the Owner is planning to upgrade communications at Segment 1 and 2 sites. The Contractor will coordinate with the Owner and its IT provider for the timing and connection of the new communications at these locations.

    a. For Communication Segment 1 sites, the Owner intends to connect to a licensed radio system provided by Mowinet at the same time the SCADA improvements being are installed. The Contractor will schedule the Work and provide notification per Technical Specifications "Supplemental Requirements for Electrical."

    b. For Communication Segment 2, the Owner is planning to install new fiber optic cable and a StarLink satellite communication system. Installation of this new communication system for Segment 2 is anticipated in the Spring of 2024. The Contractor and Owner will coordinate the Work needed to connect to the Owner's new communication improvements in Segment 2.

F. PROJECT WORK MEETINGS

1. Preconstruction Conference

    a. A preconstruction conference shall be held prior to the Work commencing on the project. The Contractor, Owner, Engineer, agencies, utilities, and other appropriate parties shall attend. The Engineer shall prepare a draft agenda and coordinate the time and place of the meeting. The meeting shall be held to discuss general contracting procedures, communications, roles and responsibilities, quality control, work schedule, agency requirements, and other topics that relate to the Work as appropriate.

    b. Prior to the Preconstruction Conference, submit a preliminary progress schedule, schedule of submittals, and schedule of values to the Engineer as required in the Agreement and in conformance to Technical Specifications – "Measurement and Payment".

    c. Attend and participate in preconstruction conference(s) for other Work at the Site to discuss the topics described in the preceding paragraph and discuss the Contractor's authority and responsibilities on the Site.

2. Progress Meetings

    a. Meet with the Owner and Engineer as needed to review the progress of the Work, Work schedule, Project concerns, etc., as may be appropriate. The intent of this meeting will be to keep communication channels open and to keep all parties informed as to the status of the Work. Generally, the meeting shall be held weekly; however, it may be scheduled at other times if needed.

b. In addition to these meetings, the Contractor and Resident Project Representative shall meet monthly, in a Record Drawing Review meeting, prior to submitting the monthly Application for Payment. This meeting will be used to review Record Drawings being kept on the Project by the Contractor.

G. EASEMENTS, PERMITS, AND LICENSES

1. Easements

   The Work is in Owner owned facilities.

2. Permits

   Electrical permits shall be obtained by the Contractor as needed to complete the Work.

3. Licenses

   Obtain all necessary licenses for performance of the Work and assume all costs incidental to the obtained licenses.

H. MOBILIZATION/DEMOBILIZATION

1. Mobilization shall consist of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the Project Site for the establishment of offices, staging areas, and other facilities necessary for Work on the Project, for premiums on bond and insurance for the Project, special fees, and for other work and operations which the Contractor must perform or costs the Contractor must incur before beginning Work on the Project.

2. Demobilization shall consist of work and operations including, but not limited to, those necessary for the movement of personnel, equipment, and incidentals from the Project Site, final disposition of demolished items, Project closeout, etc.

I. PROJECT SAFETY

1. Be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work, including excavation safety. Comply with all applicable Laws and Regulations, ordinances, rules, and orders of any public body having jurisdiction as it relates to Project and Work safety. See applicable provisions of the General Conditions, as well as all other provisions of the Contract relative to Project and Work safety.

2. Maintain local access to area residents and emergency traffic throughout the life of the Project and coordinate construction activities closely with area residents to keep them informed of operations that may impact their use of any streets or roadways.

3. All signs, barricades, barriers, lights, cones, trench boxes, shoring/bracing, and other such "devices" required to warn, protect, or direct the public and workmen during the

life of the Contract shall be furnished, installed, moved, and removed by the Contractor. When conditions warrant their use, flagpersons shall also be provided by the Contractor. The determination of what measures are required, in addition to those specifically called for by the Drawings and Specifications, shall be solely the responsibility of the Contractor.

4. The Engineer and Owner are not responsible for determining whether proper safety precautions, etc., are being utilized. Should the Contractor fail to furnish the necessary protective measures, the Owner or Engineer may, but shall not be required to, bring to the Contractor's attention by written notice of such failure and the Contractor shall undertake such corrective measures as is proper.

5. All construction Work shall be performed in accordance with the provisions of the Industrial Safety Health Administrative Safety Standards of the State of Washington Department of Labor and Industry, and other applicable regulations. It shall be the Contractor's responsibility to meet all requirements of Chapter 296 of the State of Washington Administrative Rules.

6. The materials used for and the installation of all warning and traffic control devices shall conform to the Standard Specifications for Road, Bridge, and Municipal Construction - current edition, Washington State Department of Transportation, and the Manual of Uniform Traffic Control Devices for Streets and Highways, U.S. Department of Transportation, Federal Highway Administration, current edition.

7. Workers exposed to public vehicular traffic shall be provided with and shall wear warning vests or other suitable garments marked with, or made of, reflectorized or highly visible material. No worker shall be permitted underneath loads handled by lifting or digging equipment. Workers shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.

8. Take adequate precautions, in accordance with the regulations, to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions. These precautions include providing proper respiratory protection or ventilation and, when controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, provide testing as often as necessary to ensure that the atmosphere remains safe. Provide emergency rescue equipment, such as breathing apparatus, safety harness, etc., where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

J. SHOP DRAWINGS AND SUBMITTALS

1. Submit Shop Drawings, Submittals, or manufacturer's data sheets in accordance with the Schedule of Shop Drawings and Sample submittals. It should be noted that the Engineer may require Shop Drawings for other items as may be deemed necessary. The

Contractor should review the requirements for Shop Drawings in Article 7.10 of the Agreement. An electronic file in PDF format of each item shall be submitted, unless approved otherwise by the Engineer. Provide paper copies of submittals when requested by the Engineer. Up to three additional paper copies of any submittal may be requested at the discretion of the Engineer at no additional cost to the Owner.

2. All submittals or resubmittals shall be accompanied by and furnished in accordance with the "Transmittal of Shop Drawings, Equipment Data, Material Samples, or Manufacturer's Certificates of Compliance" form provided at the end of these General Requirements or approved equal. All submittals shall be submitted at a time sufficiently early to allow review of same by the Engineer and to accommodate the rate of construction progress required under this Contract.

3. Electronic submittals will also be returned electronically within 15 calendar days. Compile the electronic (PDF) submittal file as a single, complete document. Name the electronic submittal file specifically according to its contents. Electronic files must be of sufficient quality that all information is legible. Generate PDF files from original documents so that the text included in the PDF file is both searchable and can be copied. If documents are scanned. Optical Character Resolution (OCR) routines are required.

4. Make any corrections required by the Engineer and shall return the Shop Drawings and resubmit new Samples for review. The Contractor shall direct specific attention in writing to revisions other than the corrections called for by the Engineer on previous submittals. It is considered reasonable that the Contractor shall make a complete and acceptable submittal to the Engineer by the second submission of the Drawing. The Owner reserves the right to withhold monies due the Contractor to cover additional costs of the Engineer's review beyond the second submission.

    a. If Shop Drawings are returned to the Contractor marked "NO EXCEPTIONS NOTED," formal revision and resubmittal of said Shop Drawings will not be required.

    b. If Shop Drawings are returned to the Contractor marked "NO EXCEPTIONS, PROVIDED THE FOLLOWING CONDITIONS ARE MET," formal revision and resubmittal of said Shop Drawings will not be required.

    c. If Shop Drawings are returned to the Contractor marked "MAKE CORRECTIONS NOTED," formal revision and resubmittal of said Shop Drawings will not be required.

    d. If Shop Drawings are returned to the Contractor marked "REVISE AND RESUBMIT," the Contractor shall revise said Shop Drawings and shall resubmit five paper copies or an electronic copy of said revised Shop Drawings to the Engineer.

e. If Shop Drawings are returned to the Contractor marked "REJECTED," the Contractor shall revise said Shop Drawings and resubmit five paper copies or an electronic copy of said revised Shop Drawings to the Engineer.

f. If Shop Drawings are returned to the Contractor marked "SUBMIT SPECIFIED ITEM," the Contractor shall submit material requested but shall not be required to resubmit all previous material.

5. For each resubmittal necessary, an additional 15 calendar days shall be allowed for review. Include copies of all approved submittal information in the Contractor's submitted Record Drawings and O&M Manual. A copy of each Shop Drawing and Sample shall also be kept in good order by the Contractor at the job Site and shall be available to the Engineer.

6. Additional guidance on specific submittal requirements for the electrical materials and equipment is provided in Technical Specifications, “Section 26 00 10, Supplemental Requirements for Electrical”. See the Individual Technical Specification sections for the Shop Drawings and other submittal requirements.

K. QUALITY CONTROL

1. Be responsible for providing their own construction monitoring and quality control program to ensure the materials used on the Project and in the Contractor's operations are in compliance with the Contract Documents. If requested by the Engineer, a written quality control program shall be provided to the Engineer for their review prior to any Work being performed. The plan shall describe how the Contractor will monitor and ensure quality control throughout the Work. Materials, equipment, or Work that fails to meet the Contract requirements shall not be used in the Work.

2. The Engineer and their representatives will at all times have access to the Work. In addition, authorized representatives and agents of any participating federal or state agency shall be permitted to review all Work, materials, invoices of materials, and other relevant data and records. The Contractor will provide proper facilities for such access and observation of the Work and also for any review or testing thereof.

3. Notify testing personnel, including testing personnel provided by the Owner or Engineer, at least 24 hours in advance of operations to allow for personnel assignments and test scheduling. All materials to be tested shall be provided by the Contractor at their expense. After tests are completed, be responsible for repairing test areas to match original conditions. Pay for all additional reviews and retesting required because of defective Work or ill-timed notices.

4. Tests or reviews by the Engineer or others shall not relieve the Contractor from their obligations to perform the Work in accordance with the requirements of the Contract

Documents and does not make the Engineer, or others, an insurer of the Contractor's Work.

5. Refer to Technical Specifications, “Section 26 00 10, Supplemental Requirements for Electrical” for additional quality control requirements and other Technical Specifications

L. COOPERATION WITH OTHERS

Cooperate with the residents and business owners in the area to provide good access to private property whenever possible. Sidewalks shall be kept clear at all times of any construction materials. Barricades, traffic cones, blinkers, and signing shall be used to direct the public through the Work area safely.

M. PROGRESS OF THE WORK - CLEANUP

1. Arrange their work schedule such that all phases of Work, once started, shall be diligently pursued until completed. The intent is that the work area shall not be disturbed for undue periods of time. Work shall not be left uncompleted. If the Engineer determines that Work is not being diligently completed, the Engineer shall request the Contractor to complete said Work.

2. Cleaning up shall be a continuing process from the start of the Work to final acceptance of the Project. The Contractor shall, at all times, at their own expense and without further order, keep property on which Work is in progress free from accumulations of waste material or rubbish caused by employees or by the Work, and at all times during the construction period shall maintain structure sites, rights-of-way, easements, adjacent property, and the surfaces of streets and roads on which Work is being done in a safe condition for the Contractor's workers and the public.

    a. Accumulations of waste materials that might constitute a fire hazard will not be permitted.

    b. Upon completion of the Work, the Contractor shall, at their own expense, remove all temporary structures, rubbish, waste material, equipment, and supplies resulting from their operations. They shall leave the Project site in a neat and orderly condition that is at least as good as the condition in which they found them prior to their operations.

    c. Should the Contractor fail to provide said cleanup upon 24-hour written notice, the Owner shall have the right to perform such Work at the expense of the Contractor and withhold the cost from the Contractor's payments.

N. EXISTING EQUIPMENT REMOVAL AND SALVAGE

Existing equipment or materials removed by the Contractor during the course of the Work, which the Owner requests to be salvaged, shall remain the property of the Owner. The

equipment and materials shall be removed with care to prevent unnecessary damage and shall be neatly stored at a location directed by the Engineer.

O. PARTIAL UTILIZATION OF PROJECT COMPONENTS

The existing water and wastewater systems must stay in service during the installation of the proposed project improvements. The Owner's staff will be on-hand to operate the water and wastewater systems manually (if needed) for short durations (e.g., 24 hours).

P. STARTUP AND TRAINING

It shall be the Contractor's responsibility to install all system components in accordance with the manufacturer's recommendations. All equipment shall be lubricated and adjusted as components prior to testing the system as a whole. Arrange with the Engineer to witness a test of the system and equipment after installation is completed. Provide the services of manufacturers' representatives to assist with the startup of major components and to provide training to the Owner's personnel. These tests shall demonstrate the complete facility operates in accordance with the Drawings and Specifications and the required functions. It is anticipated that minor adjustments may occur after the system has been started up. Make adjustments and correct deficiencies as required so the system can be kept in operation once it is placed into service. These adjustments, etc., shall be completed before final acceptance. Pay all costs associated with manufacturer's representatives and startup work.

As part of this Work, provide startup training to the Owner and Engineer in sufficient detail so the Owner and Engineer are fully familiar with the proper operation and maintenance of Project components and systems. The startup training shall occur after the construction Work is complete and properly functioning.

Q. RECORD DRAWINGS

1. Maintain on the Job Site an up-to-date, complete, and accurate set of Record Drawings. These Drawings shall include all Work performed by the Contractor and shall note any changes or deviations made from the details shown on the Construction Drawings. All changes shall be neatly and accurately shown on the Record Drawings.

2. The Record Drawings shall be available for inspection during the Project by the Owner and Engineer. Keep the Record Drawings current each day to avoid loss of critical or important information.

3. Certify, by signing the Application for Payment, that their Record Drawings are up to date, accurate, and complete.

4. Prior to submitting the Contractor's Notice of Substantial Completion, submit the Record Drawings to the Engineer.

5. Refer to Technical Specifications “Section 26 09 00, Instrumentation and Control” and “Section 26 10 00, Supplemental Requirements for Electrical” for additional record drawing requirements.

R. OPERATION AND MAINTENANCE DOCUMENTS

1. Operation and Maintenance documents shall conform to the requirements of Technical Specifications, “Section 26 09 00, Instrumentation and Control” and “Section 26 10 00, Supplemental Requirements for Electrical”.

2. IT IS INTENDED THAT THE O&M DOCUMENTS BE COMPLETE AND DETAILED. CONSIDERABLE EFFORT SHALL BE EXPENDED IN PREPARING THE O&M MANUAL.

END OF SECTION

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE				DATE	NO.
SECTION 1 – REQUEST REVIEW OF THE FOLLOWING ITEMS *(This section will be initiated by the Contractor)*					
TO ENGINEER:		FROM CONTRACTOR:		PROJECT	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL
ITEM No.	DESCRIPTION OF ITEM SUBMITTED *(Type, size, model number, etc.)*	MFR. OR CONTR. CAT. CURVE DRAWING OR BROCHURE NO.	No. OF COPIES	CONTRACT REFERENCE DOCUMENT SPEC. SECTION NO.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO.	COMMENTS
REMARKS NOTE: Contractor shall note any variations from requirements of the Contract Documents.				I certify that the above-submitted items have been reviewed in detail as required by the Contract Documents (see General Conditions 7.16) and have been approved by the Contractor. NAME AND SIGNATURE OF CONTRACTOR		

TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

Technical Specifications

Section 01 15 00	Alternates
Section 01 20 22	Measurement and Payment
Section 26 00 10	Supplemental Requirements for Electrical
Section 26 05 19	Low-Voltage Electrical Power Conductors and Cables
Section 26 05 23	Control-Voltage Electrical Power Cables
Section 26 05 26	Grounding and Bonding for Electrical Systems
Section 26 09 53	Identification for Electrical Systems
Section 26 09 00	Instrumentation and Control

TABLE OF CONTENTS

SECTION 01 15 00

ALTERNATES

PART 1 - GENERAL 1-1
1.1 Scope 1-1
1.2 Submittals 1-2
1.3 Quality Assurance 1-3

PART 2 - MATERIALS 1-4
2.1 Alternate 1 - Equipment Replacement 1-4
2.2 Alternate 2 - Operator Interface Terminal 1-4

PART 3 - EXECUTION 1-4
3.1 Operator Interface Terminal 1-4

PART 4 – MEASUREMENT AND PAYMENT 1-4
4.1 Basis 1-4

TECHNICAL SPECIFICATIONS

SECTION 01 15 00

ALTERNATES

PART 1 - GENERAL

1.1 Scope

A. Some or all of the following Bid Alternates may be selected by the Owner to become part of the Work.

1. Alternate 1 - SCADA Technical Support and Maintenance. If Alternate 1 is accepted by the Owner, the Contractor would provide technical support and maintenance to ensure continuous optimal functioning of the installed SCADA System for a period of three years starting at the Substantial Completion date for the Base Bid work. This Work would be awarded and executed by the Owner through a separate agreement or task order before the substantial completion date for the Base Bid.

a. Technical support and maintenance obligations shall primary off-site, when possible, by verbal communication with the Owner and/or electronically (e.g., emails or remote access to the system). On-site maintenance is proposed on an annual basis.

b. Provide technical support to the Owner as needed to resolve issues related to the SCADA system performance and operation. Support for issues with the SCADA system shall be available twenty-four hours per day, seven days per week, 365 days per year.

c. Periodic maintenance shall include providing software system updates as needed to keep the system functioning properly and any system changes requested by the Owner.

d. Maintenance Service Visits to be completed annually, shall at a minimum, require pre-notification and coordination with the Owner, and include the following.

1) System hardware checks

2) Identify of any faulty equipment that is found and provide proposed solutions

3) Functional checks of each piece of equipment in the System

4) Visual and functional checks of all remote and master site equipment

5) Test and measurement of the main operating parameters of all equipment, including indicators such as voltages, currents, frequencies, inputs, outputs, levels, and noise

6) Verify proper operation of alarm systems by simulating alarm

7) Physical inspection of the PLC panels and terminations,

8) Recommend and plan improvements to problem areas.

9) Documentation of any changes made to the System due to repair

e. PLC and Operator Interface Terminals (OIT) Software Checks:

1) PLC programming and troubleshooting as needed,

2) Perform minor software tuning or modifications as necessary to maintain proper performance and operation,

3) Routine review of alarm logs and system adjustments, as required,

4) Review operator logs for operation problems

5) Update/modify OIT screens and database to continuously improve system operation, data collection, and efficiency

2. Alternate 2 - Operator Interface Terminal. If Alternate 2 is accepted by the Owner, the Contractor will furnish and install new operator interface terminals in accordance with Technical Specifications - "Section 26 09 00 - Instrumentation and Control". The Work shall include the demolition and abandonment of the existing operator interface terminal and making the necessary connections for installation of the new operator interface terminal. The Contractor will review the available terminals and coordinate with the Engineer and the Owner on deciding which operator interface terminals would be replaced.

1.2 Submittals

A. All submittals shall be provided in conformance with the Technical Specifications "General Requirements", "Section 26 09 00 - Instrumentation and Control", and "Section 26 10 00 - Supplemental Requirements for Electrical".

B. Alternate 1

1. Provide System Backups and Documentation

a. Maintain PLC program revisions and backups on the Owner's computers,

b. Maintain up-to-date off-site disk and hard copy of PLC program,

c. Maintain up-to-date off-site disk and hard copy of all OIT configuration files,

d. Update existing Operations & Maintenance Manuals to reflect any changes made to the SCADA system

e. Maintain all records for a period of not less than seven (7) years.

2. Reports

a. Provide complete and thorough documentation and drawings of all changes and updates to the Owner's SCADA system as revisions are made.

b. Establish and maintain Site Logs recording site activities. Each time the Contractor's technicians visit a site or access the SCADA System remotely, a record of the date, time, and work performed will be recorded in the Site Log. The Site Logs shall be integrated into a Site Log report and will be completed and submitted to the Owner in a mutually acceptable format. Any equipment or device removed from the Site for repair shall be included in the Site Log.

c. Reports on the observations and recommendations made during the annual maintenance site visit.

C. Alternate 2

Submit material catalog, data sheets, shop drawings, etc. in conformance with Technical Specification " Section 26 09 00 - Instrumentation and Control."

1.3 Quality Assurance

A. Alternate 1 - Provide a skilled, experienced SCADA System Technician with not less than 3 years of direct experience programming and modifying the SCADA System in a Wastewater or Water Facility applications to provide normal, routine, and emergency service on a 7-day a week, 24-hour-a-day basis (including holidays) with a response time of not more than 4 hours.

B. Alternate 2 - Quality assurance and workmanship shall be in accordance with Technical Specifications “Sectio 26 09 00 - Instrumentation and Control” and “Section 26 10 00 - Supplemental Requirements for Electrical.”

PART 2 - MATERIALS

2.1 Alternate 1 - Equipment Replacement

A. Identify equipment that needs to be replaced or repaired. Propose new or replacement hardware, including hardware wiring and integration, as required to maintain or upgrade the SCADA system and comply with the manufacturer's service recommendations.

B. When equipment repair is recommended, provide an anticipated cost and schedule for the repair to the Owner. When equipment cannot be repaired, a replacement component and anticipated cost shall be proposed by the Contractor.

C. The replacement component or repair of an existing component must be preapproved by the Owner before installation, be equal or better performance, and be compatible with the existing systems. The cost of replacement or repair of components would be outside the scope of Alternate 1 and paid separately from the Alternate 1 agreement.

2.2 Alternate 2 - Operator Interface Terminal

Operator interface terminal shall comply with the requirements of Technical Specifications - “Section 26 09 00 - Instrumentation and Control.”

PART 3 - EXECUTION

3.1 Operator Interface Terminal

Installation, testing, training, and operation and maintenance documentation for the operator interface terminal shall be in accordance with Technical Specifications - “Section 26 09 00 - Instrumental and Control”, “Section 26 10 00 - Supplemental Requirements for Electrical”, and other pertinent Technical Specifications.

PART 4 – MEASUREMENT AND PAYMENT

4.1 Basis

See Technical Specifications – “Measurement and Payment” for a description of the basis of measurement and payment for Work to be performed for Alternates 1 and 2.

END OF SECTION

TABLE OF CONTENTS

SECTION 01 20 00

MEASUREMENT AND PAYMENT

PART 1 - GENERAL 1-1
1.1 Measurement of Quantities 1-1
1.2 Scope of Payment 1-1
1.3 Method of Payment - Base Bid - SCADA Improvements 1-3
1.4 Method of Payment - Alternate 1 - SCADA Technical Support and Maintenance 1-3
1.5 Method of Payment - Operator Interface Terminal 1-5

PART 2 - MATERIALS – NOT USED 1-5

PART 3 - EXECUTION – NOT USED 1-5

TECHNICAL SPECIFICATIONS

SECTION 01 20 00

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 Measurement of Quantities

A. The method of measurement and computations to be used in determination of quantities of materials furnished and of Work performed under the Contract will be those methods generally recognized as conforming to good engineering practices.

B. The Work completed under this Contract will be measured in accordance with the Contract Documents using U.S. Customary Units of Measurement.

1.2 Scope of Payment

A. General

The basis for measurement and payment for all Work performed under this Contract shall be as listed in the "Bid Schedule." Unless the Work to be performed is specifically called out to be measured and paid for in the Bid Schedule, payment for such Work shall be included in other applicable items of the Bid Schedule. There shall be no separate measurement and payment for any such Work not specifically listed in the Bid Schedule.

B. Lump Sum

1. Items listed in the Bid Schedule as lump sum shall be on a lump sum, all required basis. No direct measurement will be made for lump sum bid items. The price listed therein shall be payment in full for all labor, tools, equipment, materials, superintendence, and incidentals necessary to perform and complete the Work, including profit, bonding and insurance, overhead costs, permit and license fees, royalties, and applicable taxes and fees, etc., which are required to construct respective bid items according to the Contract Documents, including all Work and materials incidental thereto.

2. A schedule of values shall be provided for the Base Bid lump sum price that subdivides the work into component parts for each SCADA location in sufficient detail to serve as the basis for progress payments during the performance of the Work. In addition to SCADA location values, the schedule may include other value categories not associated with a particular SCADA location (e.g., mobilization and demobilization, operation and maintenance manuals, record drawings, etc.)

3. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

4. The schedule of values shall be provided at the Engineer for review no later than the Preconstruction Conference meeting date.

C. Unit Prices

Bid items calling for unit prices show estimated quantities of Work to be performed. These quantities, although shown with as much accuracy as possible, are approximate only and are for bidding purposes only. The Owner reserves the right to increase or decrease the amount of these quantities as may be deemed necessary. Payment to the Contractor shall be made on the quantity of Work actually performed by the Contractor.

D. Scope of Payment and Prices

The summation of all bid items under the Bid Schedule shall equal all Work required by the Drawings and Specifications regardless of whether individual items of Work are described under bid item descriptions or not. Payment shall be made at the unit or lump sum prices listed in the Bid Schedule. The prices listed therein shall be payment in full for all labor, tools, equipment, materials, etc., required to construct respective bid items according to the Contract Documents, including all Work and materials incidental thereto.

E. Payment for Partially Completed Work

1. Payment for only partially completed Work at the end of monthly pay periods shall be based on a percentage of Work completed as determined by the Engineer and based on the approved Schedule of Values submitted by the Contractor.

2. For any schedule of value representing mobilization/demobilization, 75 percent of this value will be made on the first payment request, and the remaining 25 percent of the Base Bid Contract price will be paid as part of the final payment request.

F. Payment for Materials on Hand

Partial payments may be made for materials and equipment on hand per Article 14 of the Agreement.

G. Application for Payment

Application for Payment with respect to completed Work shall be made in accordance with this Section and applicable portions of the Article 14 of the Agreement.

H. Tools

There will be no direct payment for any tools called for in the Specifications or Figures. Payment for these tools shall be included in other Bid Items.

TECHNICAL SPECIFICATIONS

SECTION 01 20 00

MEASUREMENT AND PAYMENT

1.3 Method of Payment - Base Bid - SCADA Improvements

A. Measurement for payment of the Base Bid shall be on a lump sum all required basis. There shall be no measurement of work for payment purposes.

B. Payment for the Base Bid shall be made at the Contract lump sum price stated for the "Base Bid" and shall include supervision; planning; training; coordination; project documentation; insurance and bonding; all SCADA and PLC equipment, parts, and software; tools; programming, testing, installation, removal of existing equipment and other infrastructure, operation and maintenance manuals, and all other miscellaneous materials and work necessary to satisfactorily complete the Work as specified and as shown on the Drawings and approved Shop Drawings.

1.4 Method of Payment - Alternate 1 - SCADA Technical Support and Maintenance

A. First Year SCADA Technical Support

1. Measurement for payment for first year SCADA technical support shall be on an hourly basis with documentation of the Work including, but not limited to, date worked, hours worked, and reason for the work. Work needed to correct a deficiency in the Base Bid work is specifically excluded for payment as this Work is covered under the Base Bid one-year correction period.

2. Payment shall be made at the unit prices stated in Alternate 1 for "First Year SCADA Technical Support" and shall include all labor, equipment, materials, and submittal of required documentation as specified and needed to assist the Owner.

B. Second Year SCADA Technical Support

1. Measurement for payment for second year SCADA technical support shall be on an hourly basis with documentation of the Work including, but not limited to, date worked, hours worked, and reason for the work.

2. Payment shall be made at the unit prices stated in Alternate 1 for "Second Year SCADA Technical Support" and shall include all labor, equipment, materials, and submittal of required documentation as specified and needed to assist the Owner.

C. Second Year Periodic Maintenance

1. Measurement for payment for second year periodic maintenance shall be on an hourly basis with documentation of the Work including, but not limited to, date worked, hours worked, and maintenance performed.

2. Payment shall be made at the unit prices stated in Alternate 1 for "Second Year Periodic Maintenance" and shall include all labor, equipment, materials, and submittal of required documentation as specified and needed to assist the Owner.

D. Second Year Annual Maintenance Review

1. Measurement for payment for second year annual maintenance shall be on a per each basis for each site visit made and documentation provided.

2. Payment shall be made at the unit prices stated in Alternate 1 for "Second Year Annual Maintenance Review" and shall include all labor, equipment, materials, travel expenses (including travel time, mileage, meals, etc.) and submittal of the annual maintenance site visit report.

E. Third Year SCADA Technical Support

1. Measurement for payment for third year SCADA technical support shall be on an hourly basis with documentation of the Work including, but not limited to, date worked, hours worked, and reason for the work.

2. Payment shall be made at the unit prices stated in Alternate 1 for "Third Year SCADA Technical Support" and shall include all labor, equipment, materials, and submittal of required documentation as specified and needed to assist the Owner.

F. Third Year Periodic Maintenance

1. Measurement for payment for third year periodic maintenance shall be on an hourly basis with documentation of the Work including, but not limited to, date worked, hours worked, and maintenance performed.

2. Payment shall be made at the unit prices stated in Alternate 1 for "Third Year Periodic Maintenance" and shall include all labor, equipment, materials, and submittal of required documentation as specified and needed to assist the Owner.

G. Third Year Annual Maintenance Review

1. Measurement for payment for third year annual maintenance shall be on a per each basis for each site visit made and documentation provided.

2. Payment shall be made at the unit prices stated in Alternate 1 for "Third Year Annual Maintenance Review" and shall include all labor, equipment, materials, travel expenses (including travel time, mileage, meals, etc.) and submittal of the annual maintenance site visit report.

1.5 Method of Payment - Operator Interface Terminal

A. Measurement for payment for operator interface terminal shall be on a per each basis for each installed unit.

B. Payment shall be made at the unit prices stated in Alternate 2 for "Operator Interface Terminal" and shall include all labor, equipment, materials for demolish and abandonment of the existing operator interface terminal; furnish and install new operator interface terminal, including all necessary connections; provide operation and manuals; testing; training; and all other miscellaneous materials and work necessary to satisfactorily complete the Work as specified and shown on the Drawings and approved Shop Drawings.

PART 2 - MATERIALS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

R&W ENGINEERING, INC.

SPECIFICATION SECTION	SECTION DESCRIPTION
26 00 10	Supplemental Requirements for Electrical
26 05 19	Low-Voltage Electrical Power Conductors and Cables
26 05 23	Control-Voltage Electrical Power Cables
26 05 26	Grounding and Bonding for Electrical Systems
26 05 53	Identification for Electrical Systems
26 09 00	Instrumentation and Control

The technical specification sections listed above have been prepared under the direction of the Professional Engineer, registered in the State of Washington, whose seal and signature appear below:

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SECTION 26 00 10 - SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL

1.1 SUMMARY

A. The following supplements all sections of the Specifications and applies to all work specified, shown on the Drawings, or required to provide a complete installation of approved electrical systems.

B. Furnish all labor, equipment, appliances, materials, transportation, facilities, services, tools and other equipment, and skilled supervision necessary for the construction, erection, installation, connection, testing, integration, and adjustment of all circuits and electrical equipment specified herein, shown, or noted on the Drawings; specified or required in other portions of the Specifications; and its delivery to the Owner complete in all respects and ready for use.

C. The Contractor shall be responsible for the provision of all equipment, unless otherwise specified or shown. In addition, the Contractor shall be responsible for the following:

1. Visit the site of proposed construction. Verify and inspect the existing site to determine all conditions that affect this work.
2. Investigate and be apprised of the applicable codes, rules, and regulations as enforced by Authorities Having Jurisdiction (AHJs).
3. Use this Specification as a guide for workmanship and materials of construction.

1.2 SCOPE OF WORK

A. See the Drawings for specific site locations and anticipated modifications to each existing control panel at each site.

B. The scope of this project includes, but is not necessarily limited to:

1. Replace/upgrade the Owner’s existing SCADA system with a new, complete system. The Work will include providing (2) new SCADA computers, installing and configuring new/updated SCADA HMI software, and any additional related software required for complete SCADA operations (e.g. Software Dialer program for sending alarms to City).
2. See also paragraph 1.6 Description of Work (Programming) in Section 26 09 00, Instrumentation and Control, for additional information.
3. Replace/upgrade the Owner’s MicroLogix 1100 and MicroLogix 1500 PLC systems at the various monitoring locations with new, Owner provided MicroLogix 1400 PLC and associated I/O.

    a. All modifications shall be done in the field, in the existing control panels and/or enclosures.

4. Grand Ronde Booster Pump Station/Well 1 site:

    a. Replace the Owner’s existing SLC 5/05 PLC system with a new Contractor furnished CompactLogix 5069-L330ER PLC system and required I/O.

b. Demolish the remaining Remote I/O (RIO) communications links on the SLC system and hard-wire all required RIO I/O to new CompactLogix I/O modules. Contractor to field verify remaining RIO connections. Known remaining RIO connections include (3) Allen-Bradley Variable Frequency Drives (VFDs) and Flex I/O modules.

5. Buck Creek WTP: Replace Owner's (5) existing 4-channel, 1762-IF4 analog input expansion modules with new, Owner provided Spectrum Controls 8-channel 1762sc-IF8U universal Analog Input modules. Salvage IF4's to Owner.
6. Modification of existing MicroLogix 1100 PLC programs for use with the new MicroLogix 1400 PLC systems, including the new 8-channel analog expansion modules, as required.
7. Modify any existing local Operator Interface Terminals (OITs), as may be required.
8. "Translate" existing MicroLogix 1500 programs to operate on new MicroLogix 1400 PLC systems.
9. "Translate" existing SLC 5/05 PLC program to operate on new CompactLogix PLC system.
10. Install a new MicroLogix 1400 PLC at the Waubish waste-water pump station site for inclusion in the SCADA system. PLC is for monitoring only; control of pump station to remain as existing.
11. Other related modifications, as may be required, of wells, pump stations, monitoring stations, reservoirs, etc. for proper operation and monitoring by the new/upgraded SCADA system.
12. It is not intended for the Contractor to furnish and install new process equipment (flowmeters, chlorine analyzers, pH monitors, etc.). However, where the equipment currently exists, but is not connected to the SCADA system (items indicated as "to be connected"), Contractor shall connect them to the new SCADA system. Signals and I/O marked as "future" are to have spare I/O connections on the new PLC systems.

    a. Exception: At Buck Creek WTP, Contractor to field verify if existing modulating valves have analog position transmitters. If not, Contractor is to provide position transmitters. For bidding purposes, assume Contractor is to provide (6) such position transmitters.

C. Scheduling:

1. Coordinate with the Owner for upgrades to all Pump Stations, wells, and treatment facilities to keep them operational throughout project. Coordinate any required downtime with the Owner's personnel a minimum of 7-days prior to shutting down. Provide any bypass pumping or other temporary operations required.
2. Grand Ronde Booster Pump Station/Well 1 (Booster Pump Station): Unless otherwise allowed by the Owner, complete shutdown of the Booster Pump Station shall be limited to no more than 7-days. Coordinate any shutdowns with Owner a minimum of 3-days prior to shutting down. Shutdown of site is weather dependent and may require scheduled shutdowns to be delayed. Delays in scheduled shutdowns shall not be cause for additional cost to Owner.
3. Coordinate with Owner and Owner's Information Technology (IT) consultant, Radcomp Technologies (White Salmon, WA) on the improvements for each Segment 1 and Segment 2 communication site (see Sheet G-001).

D. Sequencing: The following is the proposed sequencing of certain work. It is not intended to be absolute; the Contractor is encouraged to propose changes to the sequencing to improve the Work:

1. The new City Shops SCADA Master Workstation shall be installed and operate in parallel with the existing SCADA system. Prior to removing an updated site from the existing SCADA system, the site shall be tested and shown to be properly operating on the new SCADA system.

    a. For Strawberry Reservoir and Heritage Park Lift Station, (sites with MicroLogix 1500 PLCs), the above is not intended to require extensive modifications to the existing SCADA system due to the change in PLCs. However, monitoring by either or both SCADA system(s) must be maintained throughout the Work.
    b. Grand Ronde Booster Pump Station/Well 1 site (site with SLC 5/05 PLC): The existing SLC 5/05 PLC system polls several other sites (Well 2, Childs Monitoring Station and Reservoir) for "remote" signals required for operation. New MicroLogix PLC program may need to have remote messaging routines modified throughout project duration as dependent PLC are changed out.

2. Certain work can proceed prior to having the new City Shop SCADA Master Workstation being deployed.

    a. Waubish Street Lift Station is not currently monitored by the existing SCADA system. The new SCADA PLC can be installed independently of the deployment of the new SCADA Master Workstation. The new SCADA PLC is not replacing the existing controller. The existing autodialer is to remain in operation throughout the project. Coordinate modification and possible demolition of autodialer with Owner, once new SCADA system has been tested and Owner is satisfied all existing autodialer alarms from Waubish are being properly reported through the new SCADA system.
    b. The Heritage Park Lift Station is not currently monitored by the existing SCADA system. The new SCADA PLC can be installed independently of the deployment of the new SCADA Master Workstation.
    c. The Grand Ronde Booster Pump Station's new PLC system can be installed in the designated existing control panel (exclusive of final signal terminations) without disrupting the site's operation or removing the existing SLC 5/05 PLC and associated Flex I/O. Installation can performed independently of the deployment of the new SCADA Master Workstation.
    d. Buck Creek WTP's existing PLC is remaining; the existing 4-channel Analog Input expansion modules are being replaced with Owner provided 8-channel Analog Input expansion modules. Due to the location of the existing Analog Input expansion modules, all expansion I/O address indexing will need to be modified, which may affect the existing SCADA system (depending on how the data is currently mapped). However, it may be possible this work can be performed independently of the deployment of the new SCADA Master Workstation.

3. The Grand Ronde Booster Pump Station is a critical part of the Owner's operations and has limited time throughout the year when it can be shutdown. It is desired that this site be updated as soon as practicable.

1.3 INTENT OF DRAWINGS AND SPECIFICATIONS

A. Electrical drawings show only general locations of equipment, devices, and raceway, unless specifically dimensioned. The Contractor shall be responsible for the proper routing of raceway, subject to the approval of the Engineer.

B. Riser and other diagrams are schematic only and shall not be used for obtaining quantities.

C. The electrical drawings do not show complete details of the site conditions. The Contractor shall verify actual conditions at the project sites.

1.4 DEPARTURES FROM CONTRACT DOCUMENTS

A. Submit to the Engineer, in writing, details of any proposed departures from the Contract Documents, and the reasons the departures are necessary. Submit such requests as soon as practicable but no later than within 30 days after award of the Contract. Make no such departures without written approval of the Engineer.

1.5 COORDINATION OF WORK

A. The Contractor shall plan his work in coordination with the Engineer and Owner.

B. The Contractor shall field verify all dimensions of equipment to be installed or provided by others so that correct clearances and connections may be made between the work installed by the Contractor and equipment installed or provided by others.

C. All working measurements shall be taken from the sites, checked with those shown on the Drawings, and if they conflict, reported to the Engineer at once, and before proceeding with the work. Should the Contractor fail to comply with this procedure, he shall alter his work at his own expense as directed by the Engineer.

D. No extra payments will be allowed where obstructions in the work of other trades or work under this contract requires offsets to conduit runs.

E. The Contractor is responsible for all alterations in the work to accommodate equipment differing in dimensions or other characteristics from that shown or specified.

1.6 SUPERVISION

A. The Contractor shall maintain adequate supervision of the work and shall have a responsible person in charge during all times that work under this contract is in progress, or when necessary for coordination with other work.

1.7 CODES AND STANDARDS

A. All work and materials shall conform to the applicable current standards (standard rules, regulations, and specifications) of the National Electrical Code (NEC), National Electrical Safety Code (NESC), Institute of Electrical and Electronic Engineers (IEEE), National

Electrical Manufacturers' Association (NEMA), American National Standards Institute (ANSI), Insulated Cable Engineers Association (ICEA), Occupational Safety and Health Administration Standards (OSHA), State and local electrical codes, and other specifically cited standards, as applicable. All materials unless otherwise approved by local government authorities shall bear the label of, or be listed by, a Nationally Recognized Testing Laboratory (NRTL); the Underwriters' Laboratory, Inc. (UL) is one such NRTL. Where conflicts exist between any of the above standards, the standard which is most stringent shall take precedence. Where the Contract Documents exceed minimum requirements, the Contract Documents take precedence.

B. Observe where applicable the prevailing rules and requirements of the National Fire Protection Association (NFPA), the State and local fire marshals' regulations, and standards pertaining to adequate protection and/or guarding of any moving parts or otherwise hazardous conditions.

C. Resolve at the Contractor's expense all conflicts with applicable standards and provide a complete installation of Electrical Work, approved in all respects. Certain methods and materials for the project may require special approval and it is the Contractor's responsibility to prepare and submit to all approving authorities additional clarifying details, test data, methods and materials as needed to secure the required approval and resolve conflicts.

1.8 WORKMANSHIP

A. All work shall be performed by personnel skilled in the particular trade. Workmanship shall conform to the standards of the NEC and the installation standards of the National Electrical Contractors' Association (NECA).

B. The Engineer shall be the sole judge as to whether or not the finished work is satisfactory; and if in his judgment any material or equipment has not been properly installed or finished, the Contractor shall replace the material or equipment whenever required, and reinstall it in a manner entirely satisfactory to the Engineer without any increase in cost to the Owner.

1.9 PERMITS, FEES, AND SERVICE CHARGES

A. Contractor shall obtain all permits and pay all fees.

1.10 SUBSTITUTION OF MATERIALS AND EQUIPMENT

A. In accordance with provisions elsewhere in the Contract Documents, manufacturers' names and catalog numbers stated herein are intended to indicate the type and quality of equipment or materials desired.

B. Make requests for approval of alternates in writing to the Engineer. Provide sufficient material or data to allow evaluation of the proposed alternatives and determination of compliance with the Contract Documents. List any proposed deviations from the Contract Documents.

C. Requests for equipment substitutions will be reviewed during the submittal process. Requests for equipment substitutions received prior to the bid opening date will not be reviewed.

1.11 ELECTRICAL SUBMITTALS AFTER AWARD OF CONTRACT

A. See also Technical Specifications “General Requirements”.

B. The Contractor shall provide complete manufacturer's descriptive information and shop drawings for all equipment, material, and devices furnished under this Division, including certified outline drawings, arrangement drawings, elementary (schematic) diagrams, interconnection diagrams, and connection diagrams, in accordance with the provisions in the Contract Documents.

1. All submittals (including O & M Manuals) shall be made in an electronic, PDF format. All materials provided in the PDF submittals shall use standard page sizes of 8.5” x 11” for all non-drawing pages. Drawings and/or schematics may use 8.5” x 11”, 11” x 17”, or 22” x 34” sized pages, as applicable. Sizes 11” x 17” and 22” x 34” are generally preferred for shop drawings, sketches, wiring diagrams, and similar, but may use 8.5” x 11” provided they are normally issued and/or are legible at that scale. Large spreadsheets may use 11” x 17” where required for legibility. All pages shall be legible, regardless of page size.
2. Where manufacturer’s standard literature with non-standard page sizes are used, Contractor shall re-size such material to conform with the standard sizes listed. Contractor may use any means necessary to have the information re-sized, but all re-sized materials must be legible.
3. Electronic submittals with non-standard page sizes are subject to being returned, unreviewed, for non-compliance.

C. Manufacturer's standardized elementary diagrams shall not be acceptable unless applicable portions of the diagram(s) have been clearly identified and non-applicable portions deleted or crossed out.

D. Contractor shall check submittals for adequate identification, correctness, and compliance with Drawings and Specifications, and provide an electronic identifying mark (signature, initials, etc.) on the PDF indicating this has been done. Revise, change, and/or resubmit all submittal information until acceptable to the Engineer. Obtain Engineer's acceptance before commencing fabrication or installation of any materials or equipment.

1. When a resubmittal is requested, resubmit only the indicated deficient portions of the submittal in question or where changes have been made to previously acceptable items. Resubmitting previously acceptable items slows the review process as all resubmitted material is (re)reviewed.

E. Review of submittal information by the Engineer shall not relieve the Contractor from responsibility for deviations from Drawings and Specifications, unless he has requested and received written approval from the Engineer for specific deviations at time of submission. Review of submittal information shall not relieve the Contractor from responsibility for errors and omissions in shop drawings or literature.

F. Submittals shall be made in accordance with the schedule listed hereinafter. Provide certified shop drawings, literature, and requested samples showing items proposed for use, size, dimensions, capacity, special features required, schematic (elementary) control diagrams, equipment schedules, rough in, etc., as required by the Engineer for complete review and for installation. Use NEMA device designations and symbols for all electric circuit diagrams

submitted. Make content of schematic (elementary) connection of interconnection diagrams in accordance with the latest edition of NEMA ICS.

G. Submittals shall be made on, but not necessarily limited to, the following items, as applicable:

1. All conduit types used in project.
2. All conductor, wire, cable types used in project.
3. Proposed related software and hardware for new SCADA system.
4. Shop drawings for field modifications of existing enclosures, including MCC sections, PLC Control Panels, etc.

1.12 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Provide one copy of each final, fully-accepted submittal furnished complete in the appropriate sections of the Operation & Maintenance (O & M) Manuals. The final submittals included in the O & M Manuals shall be compiled, as may be required, from all submittals and resubmittals, with any and all corrections included. Do not include all iterations of the submittals in the O & M Manuals; provide only the final, complete, fully-corrected, and fully-accepted submittal.
2. Provide the number of hard copies specified of the final O & M Manuals for use by Owner operators and/or other personnel.
3. Include the following information:

    a. Manufacturer's operating specifications.
    b. User's guides for software and hardware.
    c. Detailed instructions covering operation under both normal and abnormal conditions.
    d. Manufacturer's instructions for setting field-adjustable components.
    e. Manufacturer's instructions for testing, adjusting, and reprogramming microprocessor controls.
    f. Operational and functional acceptance test documentation.

B. Software and Firmware Operational Documentation: Provide software and firmware operational documentation, including the following:

1. Device address list.
2. Printout of modified software application and graphic screens.

C. Software:

1. Program Software Backup: Provide USB media that is clearly and permanently labeled with attached placard on lanyard to prevent misplacement.

D. Record Drawings

1. Provide record drawings in conformance with this section and the General Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT, COMMON REQUIREMENTS

A. Unless otherwise indicated, provide all first quality, new materials and equipment, free from any defects, in first class condition, and suitable for the space provided. Provide materials and equipment listed by UL (or other acceptable NRTL), bearing their label wherever standards have been established by that agency.

B. Where two or more units of the same class of material or equipment are required, provide products of a single manufacturer. Component parts of materials or equipment need not be products of the same manufacturer.

C. Unless otherwise indicated, provide materials and equipment which are the standard products of manufacturers regularly engaged in the production of such materials and equipment. Provide the manufacturers' latest standard design that conforms to these Specifications.

D. Indicated brand names and catalog numbers are used to establish standards of performance and quality. The description of materials listed herein governs in the event that catalog numbers do not correspond to materials described herein.

2.2 EQUIPMENT FINISHES

A. Provide materials and equipment with manufacturers' standard finish system. Provide manufacturers' standard finish color, except where specific color is indicated.

2.3 PORTABLE OR DETACHABLE PARTS

A. The Contractor shall retain in his possession and shall be responsible for all portable and detachable parts or portions of installations such as fuses, key locks, adaptors, blocking chips, and inserts until completion of his work.

B. These parts shall be delivered to the Engineer and an itemized receipt obtained. This receipt, together with 2 copies of the final inspection certificate, shall be attached to the Contractor's request for final payment.

C. All equipment shall be demonstrated to operate in accordance with the requirements of this specification and the manufacturer's recommendation.

2.4 ACCESSORIES

A. Include special features, finishes, accessories, and other requirements as described in the Contract Documents regardless of the item's listed catalog number.

B. Provide incidentals not specifically mentioned herein or noted on Drawings, but needed to complete the system or systems, in a safe and satisfactory working condition.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Construction Documents:

1. Drawings are diagrammatic with symbols representing electrical equipment and wiring.
2. Electrical symbols indicating wiring and equipment shown in the Contract Documents are included in the Contract unless specifically noted otherwise.
3. Examine the entire set of Drawings to avoid conflicts with other systems. Determine exact route and installation of electrical wiring and equipment with conditions of construction.

B. Clarification:

1. The Drawings govern in matters of quantity, the Specification in matters of quality. In event of conflict on Drawings or in the Specifications, the greater quantity and the higher quality apply.
2. Should any portion of the Work in the Contract Documents conflicts with the governing codes and regulations, refrain from installing that portion of the Work until clarified by Engineer.

C. Verification of Conditions:

1. Contractor shall field verify all conditions prior to commencement of work. Examine existing VFD enclosures and PLC Control Panel for planning out all modifications required.

3.2 PREPARATION

A. Throughout this Contract, provide protection for materials and equipment against loss or damage in accordance with provisions elsewhere in the Contract Documents. Protect everything from the effects of weather.

B. Prior to installation, store items in clean, dry, indoor locations. Store in clean, dry, indoor, heated locations items subject to corrosion under damp conditions, and items containing electrical insulation, such as transformers, and conductors. Energize all space heaters furnished with equipment.

C. Following installation, protect materials and equipment from corrosion, physical damage, and the effects of moisture on insulation. Cap conduit runs during construction with manufactured seals. Keep openings in boxes or equipment closed during construction. Energize all space heaters furnished with equipment.

D. Protection of In-Place Conditions:

1. All existing to remain power wiring inside of existing enclosures shall be protected from damage. Any wiring that is damaged shall be replaced by the Contractor at no additional cost to the owner.

2. All existing-to-remain control wiring inside of enclosures shall be protected from damage. Any wiring that is damaged shall be replaced by the Contractor at no additional cost to the Owner.

3.3 INSTALLATION OF ELECTRICAL WORK

A. Common Requirements:

1. Install materials and equipment in a workmanlike manner utilizing craftsmen skilled in the particular trade. Provide work which has a neat and finished appearance.

    a. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70 (NEC) and the installation standards of NECA NEIS 1 for Work specified in Division 26. Consult Owner’s Representative for resolution of conflicting requirements.

2. Coordinate electrical work with work of other trades to avoid conflicts, errors, delays, and unnecessary interference with the Owner’s operations during construction.
3. Install electrical equipment complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of the electrical equipment, examine the instructions thoroughly. When requirements of the installation instructions conflict with the Contract Documents, request clarification from Engineer prior to proceeding with the installation.
4. Do not install electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block the area passage's intended usage.

B. Support Backing: Provide any necessary backing required to properly support all equipment installed under this contract.

C. Cutting, Patching, and Framing:

1. The Contractor shall determine in advance the locations and sizes of all sleeves, chases, and openings necessary for the proper installation of his work.
2. Whenever practicable, inserts or sleeves shall be installed prior to covering work. Cutting and patching shall be held to a minimum. All required holes in concrete construction shall be made with a core drill and patched with non-shrink grout.
3. Cutting, fitting, repairing, and finishing of carpentry work, metal work, or concrete work, and the like, which may be required for this work shall be done by craftsmen skilled in their respective trades. When cutting is required, it shall be done in such a manner as not to weaken walls, partitions, or floors; and holes required to be cut in floors must be drilled without breaking out around holes.

D. Cleaning and Touchup Painting: Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from premises and from interior and exterior of all devices and equipment. Touch up scratches, scrapes, or chips in interior and exterior surfaces of devices and equipment with finishes matching as nearly as possible the color, consistency, and type of surface of the original finish.

3.4 OPERATIONS AND MAINTENANCE MANUALS

A. Provide operations and maintenance manuals in accordance with provisions of the Contract Documents.

3.5 RECORD DRAWINGS

A. The Contractor shall maintain a neatly marked set of “red-lined” drawings. Contract Drawings shall be marked with red indelible pencil (red electronic mark-ups also acceptable) to show all departures from original Drawings; underground cable, conduit, or duct runs dimensioned from established building lines; and all electrical work revisions. In addition, the locations of panels, field mounted instruments and panels, terminal boxes, junction boxes and any other materials included in this contract shall be shown. “Red-lined” drawings shall be kept current with the work as it progresses and shall be subject to inspection by the Engineer at any time.

3.6 FIELD QUALITY CONTROL

A. Inspection: All materials, equipment, and workmanship shall be subject to inspection at any time by the Engineer, or Owner representatives. Correct work, materials, or equipment not in accordance with the Contract Documents or found to be deficient or defective in a manner satisfactory to the Engineer.

1. During site evaluations by Engineer, provide an electrician with tools to remove and replace trims, covers, devices, and the like, so that a proper evaluation of the installation can be performed.

B. Tests:

1. Carry out tests specified hereinafter and as indicated under individual items of materials and equipment specified in other sections.
2. The Contractor shall furnish all labor, material, instruments and tools to make all connections for testing of the electrical and instrumentation installation. All equipment shall be demonstrated as operating properly prior to the acceptance of the work. All protective devices shall be operative during testing of equipment.
3. General:

    a. Perform the tests as described below. Upon completion of all tests, submit written test results in duplicate for approval by the Engineer prior to acceptance.
    b. After visual inspection of joints and connections and the application of tape and other insulating materials, all sections of the entire wiring system shall be thoroughly tested for shorts and grounds. A log of results for each circuit shall be kept by the Contractor and presented to the Engineer.
    c. Equipment shall be tested by operating all electric motors, relays, controls, switches, heaters, etc. sufficiently to demonstrate proper installation and electrical connections. Control and emergency conditions shall be artificially simulated where necessary for complete system or subsystem tests.

4. Operations:

   a. After the electrical system installation is completed and at such time as the Engineer may indicate, conduct an operating test for approval. Demonstrate that the equipment operates in accordance with the requirements of these Specifications and Drawings.
   b. Perform the test in the presence of the Engineer or his authorized representative. Furnish all instruments and personnel required for the tests. The Owner will furnish the necessary electric power. System performance shall conform to the following criteria. Deviations, if any, shall be noted on the test reports with indication of corrective action taken or proposed.

      1) Insulation resistance shall be tested under normal climatic conditions and shall conform to the following:

         a) Circuits of 600 volts or less shall have conductor insulation resistance as installed of not less than 10,000,000 ohms to ground.

5. Document tests and include in O&M Manuals.

3.7 TEST REPORTS

A. Submit dated "Electrical System Test Reports" indicating all tests performed and demonstrating conformance with the required system performance criteria. This test report shall include all voltage, current and resistance test data of the electrical service, main feeders, panelboards, power transformers, and ground systems, as applicable.

3.8 FINAL CORRECTION

A. Promptly correct any failures or defects revealed by these tests as determined by the Engineer. Re-conduct tests on these corrected items as directed by the Engineer.

3.9 CLEANING

A. Remove dirt and debris caused by the execution of the electrical work.

B. Leave the entire electrical system installed under this Contract in clean, dust-free and proper working order.

C. Vacuum clean interiors of electrical equipment enclosures.

3.10 GUARANTEE

A. Materials, equipment, and workmanship shall be guaranteed in accordance with provisions of the Contract Documents.

PART 4 - MEASUREMENT AND PAYMENT

4.1 BASIS

A. See Technical Specifications “Measurement and Payment” for a description of the basis of measurement and payment for the Work performed under this Contract.

END OF SECTION 26 00 10

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SCOPE

A. The following supplements all sections of the Specifications and applies to all work specified, shown on the Drawings, or required to provide a complete installation of approved electrical systems.

B. This section covers the work necessary to furnish and install complete conductor systems as specified herein.

1.2 GENERAL

A. See Section 26 00 10, Supplemental Requirements for Electrical, which contains information and requirements that apply to the work specified herein and are necessary for this project.

1.3 SUBMITTALS AFTER AWARD OF CONTRACT

A. Submittals after award of Contract shall be made in accordance with Section 26 00 10, Supplemental Requirements for Electrical.

PART 2 - PRODUCTS

2.1 GENERAL

A. The use of a manufacturer's name and/or catalog number is for the purpose of establishing the standard of quality and general configuration desired only. Similar products of other power conductor and cable manufacturers will be considered, subject to approval by the Engineer.

B. This specification covers all conductors not specified in other sections. All conductors and cables shall be copper and shall conform to UL, Federal Specification A-A-59544, or ICEA as applicable. Provide new cable manufactured within one year of installation. Deliver to jobsite in original cartons bearing UL label.

C. Minimum conductor size: Provide 12 AWG minimum branch circuit wire size. Provide 14 AWG control circuits unless otherwise specified or required by over-current protection. Provide smaller conductor sizes for specific application where shown on the Drawings.

2.2 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Conductors: Stranded copper, complying with ASTM B8.

D. Conductor Insulation:

1. Type THHN/THWN-2. Comply with UL 83.
2. Type XHHW-2. Comply with UL 44.

2.3 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper.
2. Type: Two hole with standard barrels.
3. Termination: Compression.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders and Branch Circuits:

1. All feeders and branch circuits shall be stranded copper. Solid conductors and wires are unacceptable.
2. Use type XHHW-2 for all conductors size 2 AWG and larger. For conductors smaller than 2 AWG, contractor has the option of using XHHW-2 or THHN/THWN-2.

3.2 INSTALLATION, GENERAL

A. Observe code restrictions with respect to wet and dry locations. At the Contractor's option, conductors with insulation systems rated for high operating temperatures may be substituted for lower temperature rated conductors. However, no reduction in conductor size will be permitted from that indicated. When using small diameter wire, do not reduce conduit size below that required for Type THW or RHW (without outer covering), whichever is larger, as shown in NEC.

B. Conduit shall be thoroughly cleaned if all foreign material just prior to pulling the wire or cable.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions, sidewall pressure values, and bending radii.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Terminal strips in panels shall be identified throughout the equipment utilizing unique numbering system at the equipment enclosures and the control panels.

F. Wires terminating on terminal strips shall be tagged with the designation of the terminal strip and the number of the terminal to which they are connected. Wires shall be numbered with Brady heat shrink wire markers at all accessible locations. Wire markers shall be permanent type. Submit shop drawings of the type to be used for approval.

G. Wiring diagrams shall show the terminal strips, terminals, and their identifying designations.

3.3 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material.

3.4 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 26 05 53, Identification for Electrical Systems.

B. Identify each spare conductor at each end with identity number and location of other end of conductor; identify as spare conductor.

3.5 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Perform each of the following visual and electrical tests:

a. Inspect exposed sections of conductor and cable for physical damage and correct connections.
b. Test bolted connections for high resistance using one of the following:

1) A low-resistance ohmmeter.
2) Calibrated torque wrench.
3) Thermographic survey.

c. Inspect compression-applied connectors for correct cable match and indentation.
d. Inspect for correct identification.

e. Inspect cable jacket and condition.
f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable for a one-minute duration.
g. Continuity test on each conductor and cable.
h. Uniform resistance of parallel conductors.

B. Cables will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

PART 4 - PART 4 - MEASUREMENT AND PAYMENT

4.1 BASIS

A. See Technical Specifications “Measurement and Payment” for a description of the basis of measurement and payment for the Work performed under this Contract.

END OF SECTION 26 05 19

SECTION 26 05 23 - CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. The following supplements all sections of the Specifications and applies to all work specified, shown on the Drawings, or required to provide a complete installation of approved electrical systems.

B. Section Includes:

1. Category 6 balanced twisted pair cable.
2. Control cable.
3. Control-circuit conductors.

1.2 GENERAL

A. See Section 26 00 10, Supplemental Requirements for Electrical, which contains information and requirements that apply to the work specified herein and are necessary for this project.

1.3 SUBMITTALS AFTER AWARD OF CONTRACT

A. Submittals after award of Contract shall be made in accordance with Section 26 00 10, Supplemental Requirements for Electrical.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 CATEGORY 6 BALANCED TWISTED PAIR CABLE

A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6 cable at frequencies up to 250 MHz.

B. Standard: Comply with NEMA WC 66/ICEA S-116-732 and TIA-568-C.2 for Category 6 cables.

C. Conductors: 100 ohm, 23 AWG solid copper.

D. Shielding/Screening: Unshielded twisted pairs (UTP).

E. Jacket: thermoplastic.

2.3 CONTROL CABLE

A. Paired Cable: NFPA 70, Type CMG.

1. One pair, twisted, 18 AWG, stranded (19x30) tinned-copper conductors.
2. PVC insulation.
3. Shielded.
4. PVC jacket.

2.4 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway or Type XHHW-2, complying with UL 44 in raceway.

B. Class 2 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway or Type XHHW-2, complying with UL 44 in raceway.

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway or Type XHHW-2, complying with UL 44 in raceway.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Test cables on receipt at Project site.

1. Test each pair of twisted pair cable for open and short circuits.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA-568-C Series of standards.
2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems."
3. Terminate all conductors; cable must not contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
4. Cables may not be spliced and must be continuous from terminal to terminal. Do not splice cable between termination, tap, or junction points.
5. Cables serving a common system may be grouped in a common raceway. Install network cabling and control wiring and cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
6. Secure and support cables at intervals not exceeding 30 inch (760 mm) and not more than 6 inch (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.
8. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.
11. Support: Do not allow cables to lie on removable ceiling tiles.
12. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
13. Provide strain relief.
14. Keep runs short. Allow extra length for connecting to terminals. Do not bend cables in a radius less than 10 times the cable OD. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
15. Ground wire must be copper, and grounding methods must comply with IEEE C2. Demonstrate ground resistance.

C. Balanced Twisted Pair Cable Installation:

1. Comply with TIA-568-C.2.
2. Do not untwist balanced twisted pair cables more than 1/2 inch (12 mm) at the point of termination to maintain cable geometry.

D. Installation of Control-Circuit Conductors:

1. Install wiring in raceways.
2. Use insulated spade lugs for wire and cable connection to screw terminals.

E. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-D recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment must be as follows:

    a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inch (127 mm).
    b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inch (305 mm).
    c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inch (600 mm).

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment must be as follows:

    a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inch (64 mm).

b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inch (150 mm).
c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inch (305 mm).

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures must be as follows:

a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inch (75 mm).
c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inch (150 mm).

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inch (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inch (127 mm).

3.3 REMOVAL OF CONDUCTORS AND CABLES

A. Remove abandoned conductors and cables. Abandoned conductors and cables are those installed that are not terminated at equipment and are not identified with a tag as “spare” or for future use.

3.4 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:

1. Discrete and 24VDC power remote-control and signal circuits: 14 AWG.
2. Analog or twisted-shielded pair/triad, remote-control, and signal circuits: 18 AWG, twisted pairs.

3.5 BONDING

A. For data communication wiring, comply with TIA-607-B and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.

B. For control-voltage wiring and cabling, comply with requirements in Section 26 05 26, Grounding and Bonding for Electrical Systems.

3.6 IDENTIFICATION

A. Comply with requirements for identification specified in Section 26 05 53, Identification for Electrical Systems.

B. Identify data and communications system components, wiring, and cabling according to TIA-606-B; label printers must use label stocks, laminating adhesives, and inks complying with UL 969.

C. Identify each wire on each end and at each terminal with a number-coded identification tag. Each wire must have a unique tag.

3.7 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Visually inspect cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination, but not after cross-connection.

    a. Test instruments must meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in its "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in its "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

B. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.

C. End-to-end cabling will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

PART 4 - MEASUREMENT AND PAYMENT

4.1 BASIS

A. See Technical Specifications “Measurement and Payment” for a description of the basis of measurement and payment for the Work performed under this Contract.

END OF SECTION 26 05 23

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. The following supplements all sections of the Specifications and applies to all work specified, shown on the Drawings, or required to provide a complete installation of approved electrical systems.

B. This section covers the work necessary to furnish, install, and complete the electrical grounding system.

1.2 GENERAL

A. See Section 26 00 10, Supplemental Requirements for Electrical, which contains information and requirements that apply to the work specified herein and are necessary for this project.

1.3 SUBMITTALS AFTER AWARD OF CONTRACT

A. Submittals after award of Contract shall be made in accordance with 26 00 10, Supplemental Requirements for Electrical.

1.4 SYSTEM DESCRIPTION

A. Provide grounding and bonding of electrical circuits, equipment, signal, and control systems.

B. Performance Requirements: Supplement the grounded neutral of the secondary distribution system with an equipment grounding system to properly safeguard the equipment and personnel. Install equipment grounding such that all metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, portable equipment and other conductive items in close proximity with electrical circuits operate continuously at ground potential and provide a low impedance path for possible ground fault currents.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of the NEC, latest adopted version with amendments by local AHJ’s.

B. Furnish products listed by UL or other NRTL acceptable to AHJ.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

C. Comply with TIA-607-B.

2.2 CONDUCTORS

A. Insulated Conductors: Stranded copper or tinned-copper wire or cable, green or green with yellow stripe, insulated for 600 V unless otherwise required by applicable Code or Authorities Having Jurisdiction.

B. Bare Copper Conductors:

1. Stranded Conductors: ASTM B8.
2. Tinned Conductors: ASTM B33.
3. Bonding Conductor: 4 or 6 AWG, stranded conductor.
4. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch (41 mm) wide and 1/16 inch (1.6 mm) thick.
5. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected.

1. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Compression-Type: Copper or copper alloy, with two wire terminals.

E. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

F. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

G. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.

H. Conduit Hubs: Mechanical type, terminal with threaded hub.

I. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.

J. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.

K. Straps: Solid copper, copper lugs. Rated for 600 A.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors:

1. Where not otherwise indicated, grounding and bonding conductor sizes shall conform to the most stringent of the governing codes, except that no grounding or bonding conductor shall be smaller than 12 AWG.
2. All grounding and bonding conductors shall be stranded copper, unless specifically indicated otherwise.
3. Covering: Bare or Green-colored insulation, matching insulation of corresponding phase conductors.

B. Conductor Terminations and Connections:

1. Equipment Grounding Conductor Terminations: Bolted connectors.
2. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Three-phase motor and appliance branch circuits.
3. Flexible raceway runs.
4. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

C. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

B. Grounding system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

PART 4 - PART 4 - MEASUREMENT AND PAYMENT

4.1 BASIS

A. See Technical Specifications “Measurement and Payment” for a description of the basis of measurement and payment for the Work performed under this Contract.

END OF SECTION 26 05 26

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. The following supplements all sections of the Specifications and applies to all work specified, shown on the Drawings, or required to provide a complete installation of approved electrical systems.

B. Section Includes:

1. Labels.
2. Bands and tubes.
3. Tags.
4. Cable ties.
5. Miscellaneous identification products.

1.2 GENERAL

A. See Section 26 00 10, Supplemental Requirements for Electrical, which contains information and requirements that apply to the work specified herein and are necessary for this project.

1.3 SUBMITTALS AFTER AWARD OF CONTRACT

A. Submittals after award of Contract shall be made in accordance with Section 26 0010, Supplemental Requirements for Electrical.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1.

B. Comply with 29 CFR 1910.144 for color identification of hazards; 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs and tags.

C. Signs, labels, and tags required for personnel safety must comply with the following standards:

1. Safety Colors: NEMA Z535.1.
2. Facility Safety Signs: NEMA Z535.2.
3. Safety Symbols: NEMA Z535.3.
4. Product Safety Signs and Labels: NEMA Z535.4.
5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.

D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, must comply with UL 969.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Color-Coding for Phase- and Voltage-Level Identification, 1000 V or Less: Use colors listed below for ungrounded conductors.

1. Colors for 240/208/120 V Circuits:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.
d. Neutral: White

2. Colors for 480Y/277 V Circuits:

a. Phase A: Brown.
b. Phase B: Orange.
c. Phase C: Yellow.
d. Neutral: White or gray

3. Color for Equipment Grounds: Bare copper, Green, or Green with yellow stripe.

B. Warning Label Colors:

1. Identify system voltage with black letters on orange background.

C. Warning labels and signs must include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES." or similar.

D. Equipment Identification Labels:

1. Black letters on white field.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Brady Corporation.
b. Panduit Corp.

B. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Brady Corporation.
b. Panduit Corp.

C. Self-Adhesive Wraparound Labels: Preprinted, 3 mil (0.08 mm) thick, polyester or vinyl flexible label with acrylic pressure-sensitive adhesive.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Brady Corporation.
b. Brother International Corporation.
c. Ideal Industries, Inc.
d. Panduit Corp.

2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over legend. Labels sized such that clear shield overlaps entire printed legend.
3. Marker for Labels:

a. Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

D. Self-Adhesive Labels: Polyester or Vinyl, thermal, transfer-printed, 3 mil (0.08 mm) thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Brady Corporation.
b. Brother International Corporation.

c. Ideal Industries, Inc.
d. Panduit Corp.

2. Minimum Nominal Size:

a. 1-1/2 by 6 inch (37 by 150 mm) for raceway and conductors.
b. 3-1/2 by 5 inch (76 by 127 mm) for equipment.
c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

A. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inch (50 mm) long, with diameters sized to suit diameters and that stay in place by gripping action.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Brady Corporation.
b. Panduit Corp.

B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at maximum of 200 deg F (93 deg C). Comply with UL 224.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Brady Corporation.
b. Panduit Corp.

2.5 TAGS

A. Metal Tags: Brass, aluminum, or stainless steel, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Brady Corporation.

B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch (0.38 mm) thick, color-coded for phase and voltage level, with factory screened or printed permanent designations; punched for use with self-locking cable tie fastener.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Brady Corporation.
b. Panduit Corp.

2.6 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C) in accordance with ASTM D638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black, except where used for color-coding.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless steel screws or stainless steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. System Identification for Raceways and Cables under 1000 V: Identification must completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

H. Vinyl Wraparound Labels:

1. Secure tight to surface of raceway or cable at location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to location and substrate.

I. Snap-Around Labels: Secure tight to surface at location with high visibility and accessibility.

J. Self-Adhesive Wraparound Labels: Secure tight to surface at location with high visibility and accessibility.

K. Self-Adhesive Labels:

1. Install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide single line of text with 1/2 inch (13 mm) high letters on 1-1/2 inch (38 mm) high label; where two lines of text are required, use labels 2 inch (50 mm) high.

L. Snap-Around Color-Coding Bands: Secure tight to surface at location with high visibility and accessibility.

M. Heat-Shrink, Preprinted Tubes: Secure tight to surface at location with high visibility and accessibility.

N. Marker Tapes: Secure tight to surface at location with high visibility and accessibility.

O. Self-Adhesive Vinyl Tape: Secure tight to surface at location with high visibility and accessibility.

1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for minimum distance of 6 inch (150 mm) where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

P. Metal Tags:

1. Place in location with high visibility and accessibility.
2. Secure using general-purpose cable ties.

Q. Nonmetallic Preprinted Tags:

1. Place in location with high visibility and accessibility.
2. Secure using general-purpose cable ties.

R. Write-on Tags:

1. Place in location with high visibility and accessibility.
2. Secure using general-purpose cable ties.

PART 4 - MEASUREMENT AND PAYMENT

4.1 BASIS

A. See Technical Specifications “Measurement and Payment” for a description of the basis of measurement and payment for the Work performed under this Contract.

END OF SECTION 26 05 53

SECTION 26 09 00 – INSTRUMENTATION AND CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. The following supplements all sections of the Specifications and applies to all work specified, shown on the Drawings, or required to provide a complete and operational Instrumentation and Control System (System).

B. This section covers all work necessary for furnishing, installing, adjusting, testing, documenting, and starting up the System, including the interconnection and integration of components furnished under other sections of this contract.

C. Major constituents for the System include, but are not limited to, all materials, equipment, and work required to implement a complete, and operating System. The System shall include primary elements for process variable measurements, analog display and control elements, and discrete display and control elements.

D. Additional constituents for the System include, but are not limited to, all materials, equipment and work related to implementing System communications. System communications includes sending and receiving data between components of the System, and monitoring and alarming status of System components. This shall include the supply, installation, and testing of telephonic, radio, and networking components and cabling required for System operation, and components specified in this section.

E. Responsibility for Complete System:

1. The Contractor shall:

    a. Be ultimately responsible and shall provide for all labor, equipment, and materials not provided by others that are necessary for the supply, installation, certification, adjustment, testing, and start-up of a complete coordinated System that shall reliably perform the specified functions. The assignment of specific responsibility herein shall not, in any way nor under any conditions, diminish or usurp the Contractor’s full and complete responsibility for all work performed and all materials installed under the contract.
    b. Participate in the testing of all field devices at start-up.

2. The Control Systems Integrator:

    a. May be the same entity as the Contractor.
    b. Shall be responsible for:

        1) Providing and installing or modifying any programmable controller logic programs (as required), providing fully documented back-up electronic copies and printed (PDF) copies of the controller logic program, and shall

participate in the testing of the controller systems and all associated field devices at start-up.

2) Providing and installing or modifying any Operator Interface programs (as required), providing back-up electronic copies of the Operator Interface programs, and shall participate in the testing of the Operator Interface systems at start-up.
3) Providing and installing any required custom software programs (C, C++, VB, etc.), as may be applicable; providing fully documented back-up electronic copies and printed (PDF) copies of each custom software program; and shall participate in the testing of the System and all associated field devices at start-up.
4) Providing and installing the new SCADA system complete, including all related software required for City operations and reporting, providing a back-up electronic copy of the SCADA system, and shall participate in the functional testing of the SCADA system at start-up.

3. Both the Contractor and Control Systems Integrator shall coordinate their work to ensure that:

a. All components provided under this section, whether Contractor provided, Owner Purchased Equipment, or provided by others for Contractor to install are properly installed.
b. The proper type, size, and number of control wires with their conduits are provided and installed.
c. Proper electric power circuits are provided for all components and systems.

F. Control Systems Integrators/Installers:

1. The Control Systems 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).
2. The Control Systems Integrator shall have the following qualifications:

a. The Control Systems Integrator shall be an instrument and control system assembling company with their own panel shop.
b. The Control Systems Integrator’s assembly facility shall be located within a 200-mile drive from White Salmon, WA.
c. The Control Systems 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.
d. The Control Systems 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.
e. The Control Systems 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.

G. The Contract Documents are a single integrated document, and as such all Divisions and Sections apply. It is the responsibility of the Contractor and its subcontractors to review all sections to ensure a complete and coordinated project.

H. Unless otherwise specified, references to documents shall mean the documents in effect on the effective date of the Agreement. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organizations or, if there are no replacement documents, the last version of the document before it was discontinued.

1.2 STANDARDS

A. This Section incorporates the latest adopted revision of the following standards, by reference. In case of conflict between the requirements of this section and those of the listed standards, the more stringent requirements shall prevail.

1. NFPA – National Fire Protection Association

    a. NFPA No. 70, NEC - National Electrical Code.
    b. NFPA No. 79, Electrical Standard for Industrial Machinery.

2. ISA – Instrumentation, Systems, and Automation Society.
3. ICS – NEMA (National Electrical Manufacturer's Association) Industrial Control and Systems including:

    a. ICS-1 – General Standards for Industrial Control and System.
    b. ICS-2 – Standards for Industrial Control Devices, Controllers and Assemblies.
    c. ICS-3 – Industrial Systems.
    d. ICS-4 – Terminal Blocks for Industrial Control Equipment and Systems.
    e. ICS-6 – Enclosures for Industrial Controls and Systems.

4. ANSI/IEEE – American National Standards Institute/Institute for Electrical and Electronics Engineers.
5. State and Local codes and ordinances.
6. UL – Underwriter’s Laboratory UL (Note: Other Nationally Recognized Testing Laboratories [NRTL], such as ETL, may be used in lieu of UL.)

    a. Standard 508 (Industrial Control Panels for General Use).
    b. Standard 698 (Industrial Control Panels Relating to Hazardous (Classified) Locations)
    c. Standard 913 (Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations)

7. NETA – National Electrical Testing Association.

1.3 ELECTRICAL TESTING LABORATORY LABELING

A. All panels provided under this section shall be labeled by a Nationally Recognized Testing Laboratory (NRTL) of electrical systems, acceptable to the State of Washington; Underwriters’ Laboratory (UL) and Electrical Testing Labs (ETL) are two such NRTLs. Labels shall be provided by an entity that is currently registered and authorized by the NRTL to provide such labels.

B. All panels provided under this section shall be acceptable to the State of Washington and the authority having jurisdiction.

C. All panels and components provided under this section shall conform to the more stringent of the technical specifications or the applicable NRTL standards (for example: UL standards 508, 698, and/or 913).

1. Provide documentation necessary to verify that all components, construction methods, and circuits conform to the standard.
2. Panels that use Intrinsically Safe (IS) devices (barriers and/or relays) and built to UL standards shall include documentation of UL standards 698 and/or 913, as applicable. Panels built to other equally acceptable NRTL standards (such as ETL) shall provide required documentation showing IS components and wiring are in compliance with that standard.

D. Contractor shall provide additional design, components, and equipment necessary to meet the requirements of the applicable NRTL standards.

E. Contractor shall provide submittals for additional components that are required by the applicable NRTL standards, but not specifically listed in this section.

1.4 SUBMITTAL DATA

A. See also Technical Specifications "General Requirements" and Section 26 05 00, Supplemental Requirements for Electrical for additional requirements, including page sizes.

B. Post-Contract Award Submittals: Submit shop drawings and equipment review data as specified in "General Requirements" of the Technical Specifications. In addition to the requirements of other Divisions and Sections of the Specifications, the submittal information shall be provided within 30 days of award.

C. Submittals shall include, but not necessarily be limited to, the following:

1. All equipment to be supplied shall be listed followed by descriptive data sheets. The equipment list shall include each component name, manufacturer, model number, description of the operation, quantity supplied, and any special setup and operation and maintenance characteristics.

    a. Similar components used in the project shall be the product of a single manufacturer.
    b. Service and replacement components for all equipment shall be normally stocked and readily available from service centers and suppliers in Washington, Oregon, or Idaho.

2. Description and operation of all remote site hardware and the configuration features of the I/O and local control loop characteristics.
3. Catalog information, descriptive literature, wiring diagrams, and shop drawings on all electrical devices, components, panels, and enclosures furnished under this section.
4. Individual data (or specification) sheets shall be provided for all components provided under this section. The purpose of these data sheets is to supplement the generalized

catalog information provided by citing all specific features for each specific component (e.g. materials of construction, special options included, calibration data including scale and range, etc.). Each component data sheet shall bear the component name and instrument tag number designation.

5. Panel elementary diagrams of pre-wired panels. Show all signals, analog and discrete, and all auxiliary devices such as relays, terminals, alarms, fuses, lights, fans, heaters, etc. Diagrams, device designations, and symbols shall be in accordance with NEMA ICS 1-101.
6. Panel elementary diagrams of panel assemblies. Show all signals, analog and discrete, and all auxiliary devices such as relays, terminals, alarms, fuses, lights, fans, heaters, etc. Diagrams, device designations, and symbols shall be in accordance with NEMA ICS 1-101.
7. Interconnecting wiring diagrams, with terminal identification numbers and external wire numbers, for the System. This diagram shall include all intermediate terminations between field elements and panels (e.g. terminal junction boxes, motor control centers, etc.). This diagram shall be coordinated with the electrical contractor and shall bear his mark showing that this has been done. Diagrams, device designations, and symbols shall be in accordance with NEMA ICS 1-101.
8. Loop diagrams, with terminal identification numbers and external wire numbers for each control loop in the System. This diagram shall include all intermediate terminations between field elements and panels (e.g. terminal junction boxes, motor control centers, etc.). This diagram shall be coordinated with the electrical contractor and shall bear his mark showing that this has been done. Diagrams, device designations, and symbols shall be in accordance with ISA Standards and Practices for Instrumentation.

D. In addition: Before any components are fabricated, and/or integrated into assemblies, or shipped to the site, the Contractor shall furnish to the Engineer, and receive his review of full details, shop drawings, catalog cuts, 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.

E. The intent of the submittal is to ensure complete project scope coverage and does not relieve the supplier from fulfilling any specified requirements. The submittal shall consist of legible printed text and high quality CAD drawings, in PDF format, with descriptive bookmarks at all major and minor divisions of the document. The submittal shall address all hardware and software to be supplied.

1. Catalog information shall be submitted for all equipment, regardless of whether or not it is of the same manufacturer as that listed in the Specifications.
2. Where allowed, requests for substitution must be made in writing, and shall include corresponding copies of all literature and information required for evaluation of the proposed substitution. This must be done within 30 days of the contract award.

F. All submittals shall be complete, neat, and orderly. Partial submittals are not acceptable and may be returned, without being reviewed, for correction. All components shall be referenced by the instrument name tag designations.

G. If in the opinion of the Engineer a submittal is not clear, it will be returned to the Contractor and it shall be revised and resubmitted within 15 days.

1. When a resubmittal is requested, resubmit only the indicated deficient portions of the submittal in question or where changes have been made to previously acceptable items. Resubmitting previously acceptable items slows the review process as all resubmitted material is (re)reviewed.

H. Requests for equipment substitutions will be reviewed during the submittal process. Requests for equipment substitution received prior to the bid opening date will not be reviewed.

1.5 OPERATIONAL AND MAINTENANCE (O&M) MANUALS

A. The Contractor shall provide (1) electronic copy (in PDF format), and two (2) printed (loose-leaf) copies of detailed sets of Operation and Maintenance (O&M) manuals with complete information concerning the operation of the System within 30 days after start-up of the equipment. The O&M manuals shall include information related to diagnosis, down to the module and card replacement level.

B. The manuals shall include all project specific information and the printed copies shall be furnished in three-ring binders with indexed tab sections. The PDF copy shall have descriptive bookmarks at all major and minor divisions, similar to the indexed tabbed sections of the printed copies. The O&M Manuals shall contain descriptive material, drawings, and figures bound in appropriate places.

1. The manuals shall include operation and maintenance literature for the entire System and all components provided. The submitted literature shall be in sufficient detail to facilitate the operation, removal, installation, adjustment, calibration, and maintenance of each component provided.
2. The manuals shall include data sheets for all significant equipment used in the System. Significant equipment is defined as equipment performs a function other than simple interconnection. The data shall include, as a minimum, the component name, manufacturer, model number, quantity, and any special O&M characteristics.

    a. Factory calibration data sheets shall be included for all transmitters and transducers.
    b. Field calibration data sheets shall be included for all transmitters and transducers.

3. The manuals shall include wiring diagrams for all components provided. These wiring diagrams shall clearly show all terminals, terminal block number designations, and wire numbers. Diagrams, device designations, and symbols shall be in accordance with NEMA ICS 1-101.
4. The manuals shall include final as-built drawings (22" by 34" and 11" x 17" reduced) of equipment. These drawings shall include:

    a. Layout drawings for each panel shall include overall dimension details for each component and all door mounted operator devices including nameplate designations.
    b. Interconnecting wiring diagrams of all equipment installed or connected under this contract.

c. Control loop diagrams showing operation of the System.

C. The manuals shall include a detailed functional description of the System. Control loops shall be fully described in the functional description. A detailed description of remote site features such as I/O and local control loops shall be included.

D. The manuals shall include final versions of the following software related items:

1. A fully documented back-up electronic copy of all controller logic programs, on non-magnetic media compatible with the System.
2. A fully documented printed copy of the controller logic program.
3. A fully documented back-up electronic copy of all custom software programs, on non-magnetic media compatible with the System.
4. A fully documented back-up electronic copy of all SCADA programs, on non-magnetic media compatible with the System.
5. A fully documented back-up electronic copy of all operator interface programs, on non-magnetic media compatible with the System.

E. The manuals shall include a listing of all recommended spare parts.

1. Spares and Expendables Recommendations: The Contractor shall provide a list of recommended spares and expendable items in sufficient quantities to sustain the System for a period of one (1) year after acceptance.
2. In addition to the Spares and Expendables List, the Contractor shall provide a Component Parts List. The Component Parts List shall be a complete parts list for the entire System and shall have the following features:

a. All components shall be grouped by component type, with the component types identified in a similar manner to the component identification code used in these Specifications.
b. All components shall be listed with their exact and complete manufacturer's part number, including all options and accessories.
c. All components shall be identified with their complete tag number as shown in these Specifications, or as modified or assigned by Contractor and approved by the Engineer.
d. All components without tag numbers shall be grouped within component type by manufacturer's part number. Exact quantities shall be listed for each part number.

1.6 DESCRIPTION OF WORK (PROGRAMMING)

A. The following is a general description of anticipated work required to modify existing PLCs, Operator Interface Terminals (OITs), and new SCADA/HMI configurations/programming for proper operation. It is not an exhaustive description as existing field conditions may dictate additional changes not necessarily listed here.

B. PLCs:

1. The “functional description” of all the existing PLC systems are not changing, except where additional I/O devices may be added to the new, replacement PLCs. All other functionality and operations are to remain “as is” unless otherwise directed by the Owner.

2. For locations with PLC's using 120VAC digital inputs (Strawberry Reservoir, Heritage Plaza Lift Station, Grand Ronde Booster Pump Station/Well 1), convert signals to 24VDC digital inputs for connection to the new PLCs. Where existing signals are not "dry" contacts, install interposing relays, power supplies, and/or other appurtenances, as may be required.
3. For all existing MicroLogix 1100 PLCs and the one existing MicroLogix 1400 PLC, obtain a fully documented (if possible) copy of the most recent PLC program available.

    a. Visit each site and upload the existing PLC program (from the PLC into the laptop) into the fully documented copy before making any changes.
    b. For the existing MicroLogix 1100s, modify the uploaded program by changing the CPU type from MicroLogix 1100 to MicroLogix 1400.
    c. Modify, as required, existing expansion I/O module configuration to replace existing 4-channel, 1762-IF4 Analog Input expansion modules with new, Spectrum Controls 8-channel, 1762sc-IF8U universal Analog Input expansion modules.

        1) Modify existing program to initialize the new Spectrum Controls modules. New modules shall be configured for "Engineering Units x 1" for a 4-20mA type input so reported raw values correspond with sensor input milliamp values (i.e. 4000 = 4.0mA, 20,000 = 20.0mA). Use "Scale with Parameters" function blocks to scale "raw" data to process units (e.g. 0-2500 GMP, 0-100 PSI, etc.).
        2) Modify/re-index any I/O that may be affected by the replacement of existing 4-channel, 1762-IF4 Analog Input expansion modules with the new Spectrum Controls 1762sc-IF8U units.

    d. Download modified PLC program into the new MicroLogix 1400, prior to installation of unit in field.

4. For existing MicroLogix 1500 PLCs, obtain a fully documented (if possible) copy of the most recent PLC program available.

    a. Visit each site and upload the existing PLC program (from the PLC into the laptop) into the fully documented copy.
    b. Study/review the existing PLC program and translate it to work for the new MicroLogix 1400 PLCs. Note that the same programming software is used for the MicroLogix 1500 and the MicroLogix 1400, but some of the individual instructions may be PLC-specific.
    c. Heritage Park Lift Station: Specifically for the Heritage Park Lift Station, use the inherit Modbus RTU capabilities of the MicroLogix 1400 to replace the existing Modbus RTU module.
    d. Download and completely test the new MicroLogix 1400 programs for running the respective locations to the satisfaction of the City.

5. For the existing SLC 5/05 PLC (Grand Ronde Booster Pump Station/Well 1), obtain a fully documented (if possible) copy of the most recent PLC program available.

    a. Visit the site and upload the existing PLC program (from the PLC into the laptop) into the fully documented copy.
    b. Study/review the existing PLC program and translate it as required for the new CompactLogix PLC, for proper site operations. The existing 5/05 program has

been extensively modified over the years; determine which portions may be left over (abandoned) from previous changes and do not include them in the translated program. Do not "export" SLC 5/05 rung comments or operator descriptions for "importing" into new CompactLogix PLC; provide "fresh" documentation.

c. Download and completely test the new CompactLogix program to the satisfaction of the City.

6. For the Waubish Lift Station, install a new MicroLogix 1400 PLC and connect the indicated I/O from the existing controller/system for monitoring by SCADA. Use additional/interposing relays, where required. No remote control functionality is required for this site.
7. When all testing and verification of pump station operation is completed, save the final modified PLC program off-line and download to the PLC to "clear" the on-line editing cache.

C. OITs (Local Touchscreens):

1. Modify any/all local OIT programming/configurations to operate with the new MicroLogix 1400 PLCs. OIT functionality to remain "as is", just connected to the new PLCs.
2. Sites known to have local OITs:

a. Heritage Park PS (A-B PanelView 300)
b. Buck Creek WTP (A-B PanelView Plus 600)
c. Buck Creek Monitoring Station (A-B PanelView Plus 600)

3. Contractor to provide and replace existing OITs (including the applications) with new units if Owner accepts and awards Alternate 2.

D. SCADA/HMI Master and Remote Terminals:

1. Configure the new SCADA/HMI Master and Remote Terminals for communicating with the new PLCs. For bidding purposes, include 8-hours of coordination time with Owner to verify elements to be included in the SCADA/HMI and reporting system. Provide screenshots of initial reporting systems and graphical displays, including but not limited to operational, trending, and alarming displays for Owner comments. Incorporate Owner comments into SCADA screen/configuration design.
2. All sites shall include monitoring of the various I/O and process systems.
3. Where indicated by the Owner, incorporate remote controlling of pump stations, wells, treatment facilities, etc. as may be desired. If necessary, incorporate such controls into the PLC programs for the new PLCs.

PART 2 - PRODUCTS

2.1 GENERAL

A. Whenever any material, article, device, product, or fixture is indicated or specified by patent or proprietary name, by name of manufacturer, or by catalog number, as shown on the Drawings, such specifications shall be deemed to be used for the purpose of establishing a standard of

quality and facilitating the description of the material or process desired. This procedure is not to be construed as eliminating from competition other products of equal or better quality by other manufacturers where fully suitable in design, and shall be deemed to be followed by the words "or approved equivalent". The decisions relative to equality shall be by the Engineer and Owner.

B. The design of the Instrumentation and Control System is based on the specific equipment specified hereinafter. For example, for equipment listed, the design is based on the named manufacturer. Should the Contractor select other equipment that requires different installation requirements, wiring and conduit, enclosures, accessories, etc., the Contractor shall obtain approval from the Engineer for such changes to the design in accordance with this Contract and shall make all approved changes at no additional cost to the Owner.

C. Analog signals shall be 4 to 20 mA DC, unless otherwise shown, conforming to the compatibility requirements of ISA Standard S50.1. Unless otherwise shown, circuits shall be Type 2 two-wire. Transmitters shall have a load resistance capability conforming to Class L. Transmitters and receivers shall be fully isolated. All instrumentation shall be compatible with the type of signal specified.

D. Discrete signals are two-state logic signals of two types: control and alarm. Control and alarm signals shall utilize 24 VDC or 120 VAC sources, as shown. Unless otherwise shown, all alarm signals shall open on alarm condition, and have isolated contacts rated for 5 amperes (minimum) at 24 VDC/120 VAC.

E. Nameplates, name tags, and service legends shall be used to identify all major components provided under this section. Major components are defined as components that perform a function other than simple interconnection.

1. Nameplates are defined as engraved rigid laminated plastic plates bearing the entire identifying text or ISA tag number of the component. Nameplates shall be securely mounted under or near a mounted component.
2. Name tags are defined as stamped stainless steel tags, unless otherwise noted, bearing the entire identifying text or ISA tag number of the component. Nametags shall be securely attached to the component.
3. Service legends are defined as engraved rigid laminated plastic legends bearing the entire identifying text or ISA tag number of the component integrally mounted on a panel face mounted instrument.
4. Service legends and panel interior mounted nameplates shall be black with white letters, and letter height shall be minimum 3/16-inch high characters, unless otherwise noted.
5. Panel exterior mounted nameplates shall be black with white letters, and letter height shall be minimum 3/8-inch high characters, unless otherwise noted.
6. Each panel assembly shall be provided with a face mounted engraved rigid laminated nameplate bearing the entire identifying text for the panel assembly. The nameplate shall be securely attached to the panel.

F. Wire labels are defined as machine printed heat-shrink tube type labels bearing the entire identifying text of the wire. Wire labels shall be furnished for all wires in each panel assembly provided. Label both ends of wires more than 6 inches in length. Label one end of wires less than or equal to 6 inches in length. Shrink labels in place with lettering in position to be easily read and no more than one (1) inch from the connecting terminal.

G. Terminal markers are defined as machine printed markers bearing the entire identifying text of the terminal. Terminal markers shall be furnished for all terminal blocks, fuse blocks, and grounding blocks provided. Securely mount terminal markers with lettering in position to be easily read.

H. Interposing relays, loop isolators, intrinsically safe barriers, and terminating resistors shall be furnished wherever necessary, as indicated by the instrument and/or installation, regardless of whether they are indicated on the Drawings, to perform the functions shown herein and on the Drawings.

2.2 CIRCUIT BREAKERS

A. Where required, Circuit Breakers shall be provided as a Panel Assembly component to perform the functional requirements of the System, as specified.

B. Circuit Breakers shall meet the following minimum specifications, unless otherwise noted.

1. Energy limiting design to protect downstream components better than conventional breakers during short circuits.
2. IP2x Finger protection
3. DIN rail mounted.
4. UL 489 approved.
5. UL 1077 approved.

C. Acceptable manufacturers and products include:

1. Allen-Bradley, Bulletin 1489.
2. Altech, UL Series
3. ABB, S2 Series
4. Weidmuller
5. Similar units by other manufacturers may be considered for use on this project based on comparison to these lines. Approval of substitutions is solely at the discretion of the Engineer.

2.3 FUSES

A. Where required, Fuses shall be provided as a Panel Assembly component to perform the functional requirements of the System, as specified.

1. NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

2.4 TERMINAL BLOCKS

A. Where required, Terminal Blocks shall be provided as a Panel Assembly component to perform the functional requirements of the System, as specified.

B. Terminal Blocks shall meet the following minimum requirements, unless otherwise noted:

1. Single circuit, feed-through type
2. Two-level, feed through type for analog input signals, or where indicated.
3. DIN rail mounted.
4. Screw clamp connection.
5. Sized for the application, minimum 30 A rated.
6. 600 VAC/VDC rated.
7. It shall be possible to use a ‘standard’ instrument screwdriver blade on the terminal screws. Terminals which require ‘reduced size’ or ‘tweak’ screwdrivers to access terminals will not be accepted.

C. Approved manufacturers include:

1. Allen-Bradley.
2. ABB, type M4/6
3. Phoenix Contact Inc.
4. Weidmuller.
5. Similar units by other manufacturers may be considered for use on this project based on a comparison to these lines. Approval of substitutions is solely at the discretion of the Engineer.

2.5 FUSE-HOLDING TERMINAL BLOCKS

A. Where required, Fuse-holding Terminal Blocks shall be provided as a Panel Assembly component to perform the functional requirements of the System, as specified.

B. Fuse-holding Terminal Blocks shall meet the following minimum specifications, unless otherwise noted.

1. Single circuit, feed through type.
2. DIN rail mounted.
3. Screw clamp connection.
4. Sized for the application.
5. Blown fuse indication unless otherwise noted.
6. Contractor shall include appropriately sized fuses with all Fuse-holding Terminal Blocks.
7. It shall be possible to use a ‘standard’ instrument screwdriver blade on the terminal screws. Terminals which require ‘reduced size’ or ‘tweak’ screwdrivers to access terminals will not be accepted.

C. Approved manufacturers and products include:

1. Allen-Bradley, Bulletin 1492-WFB424/4250.
2. ABB, type M4/8 SFL
3. Phoenix Contact Inc., Type UK-5 HESI.

4. Weidmuller, type ASK.
5. Similar units by other manufacturers may be considered for use on this project based on a comparison to these lines. Approval of substitutions is solely at the discretion of the Engineer.

2.6 PLC HARDWARE

A. This project shall utilize the Rockwell Automation PLCs:

1. Grand Ronde Booster Pump Station/Well 1 site: Allen-Bradley CompactLogix 5069-L330ER series PLCs, accessories, and compatible I/O modules.
2. All other sites: Allen-Bradley MicroLogix 1400 series PLCs, accessories, and compatible expansion modules.

B. Contractor shall furnish and install the CompactLogix 5069-L330ER PLC, 5069-series I/O modules, and associated accessories and appurtenances, as required.

1. CPU: 5069-L330ER
2. Digital Inputs: 5069-IB16 (16-point 24VDC sinking)
3. Digital Outputs: 5069-OW16 (16-point non-isolated, NO Relays)
4. Analog Inputs: 5069-IF8 (8-channel Voltage/Current inputs)
5. Analog Outputs: 5069-OF8 (8-channel Voltage/Current outputs)

C. The Owner shall furnish all replacement MicroLogix 1400 base units for the Contractor to install.

D. The Owner shall furnish (8) 8-channel, universal Analog Input expansion modules for the Contractor to install at the following sites:

1. Buck Creek WTP
2. Heritage Park Lift Station
3. Waubish Lift Station
4. Strawberry Reservoir

E. Where required, the Contractor shall furnish and install the following types of Expansion I/O Modules for the MicroLogix 1400 systems:

1. Digital Input: 1762-IQ16 (16-point 24VDC)
2. Digital Output: 1762-OW16 (16-point non-isolated Relay)
3. Analog Input: Spectrum Controls, 1762sc-IF8U (8-channel universal)
4. Analog Output: 1762-OF4 (4-channel)

F. Spares: The Contractor shall furnish the following spare units:

1. Two MicroLogix 1400, model 1766-L32BWAA
2. Three 1762-IQ16, 16-point, 24VDC digital input
3. Three 1762-OW16, 16-point non-isolated Relay Output
4. Three 1762sc-IF8U, universal analog input, by Spectrum Controls

2.7 OPERATOR INTERFACE TERMINALS (OIT'S)

A. Contractor to provide a separate line item for upgrading the City's existing Operator Interface Terminals (OITs) as an Additive Bid Alternate. Include cost of (1) fully licensed copy of the configuration software as part of the Additive Bid Alternate.

B. OITs shall have configuration software supplied with the unit to allow creation of linked screens displaying various forms of data including color graphical representation of the process, alarm conditions, and/or operator input.

C. OITs shall have:

1. Interactive graphical displays for monitoring the local operation of the site and allow operators to adjust setpoints or other adjustable paramaeters.
2. Real-time clock
3. Sufficient memory for up to 100 screens of data

D. Units shall be capable of generating alarm screens which monitor critical data registers and provide notifications when values exceed alarm threshold setpoints.

E. Acceptable manufacturers include:

1. Red Lion
2. Rockwell Automation/Allen-Bradley
3. Similar units by other manufacturers may be considered for use on this project based on comparison to these lines. Approval of substitutions is solely at the discretion of the Engineer.

2.8 WORKSTATION (SCADA) COMPUTERS

A. Provide (2) workstation computers for running the SCADA application and related software on the Master and Remote Terminals. One workstation shall be located at the City Shops (Master), the other to be located at the Grand Ronde Booster Pump Station (Remote). Configure both workstations "identically" for redundancy and "backup" purposes.

B. Hardware: The following specifications are minimum requirements. Dell Precision series are used as the basis of design, but other manufacturers that meet or exceed these specifications are acceptable:

1. CPU: Intel Xeon series, 6 cores (min). AMD CPUs are not acceptable.
2. Graphics Card: nVidia T1000, 8GB (min) GDDR6. Comparable AMD (Radeon) Graphics cards, Intel Arc series graphics cards, or other nVidia series are acceptable.
3. Power Supply: As recommended by manufacturer but not less than 850W.
4. RAM: 32 GB DDR4 or later, 2933 MHz (min).
5. USB Ports: (6) USB 3.x (Type A) (min), (2) USB Type-C (min).
6. Storage:

a. OS (Boot) Drive: Provide a separate drive for installation of the Operating System (OS). Applications to be installed on the secondary drive. OS Drive to be M.2 NVMe SSD, 1 TB (min)

b. Secondary Drive: M.2 NVMe SSD, 2 TB (min).
c. Data Storage Drive: Removable SATA 3 HDD, 7200 RPM (min), 2 TB (min).

7. Ethernet Port: One 1Gb Ethernet port (min).
8. Other: Provide additional accessories and/or appurtenances as may be required including, but not necessarily limited to, full-size keyboard, optical mouse, CPU cooling fac, case cooling fan(s), connection cables and/or adapters, power cord, etc.

C. Software (non-SCADA): Remove any non-required "bloatware" that may be pre-installed on the computers. Computers shall have, as a minimum, the following non-SCADA software installed:

1. Virtual Machine (VM): Provide and install VM software capable of using "3D Accelerated Graphics", vGPU, or "passthrough" GPU support. VM software must be fully licensed (not subscription-based) and be compatible with SCADA application software.

a. Host OS: Windows 11 Pro for workstations or Windows 10 Pro for workstations (may be pre-installed on Dell or other pre-configured computers).
b. Guest OS: Windows 10 Pro for workstations
c. VM Tools: Provide and install any additional drivers, virtual hardware, or "tools" software package(s), as required or recommended by the VM manufacturer for enhanced operation of the VM.
d. Acceptable VM software packages include VMWare Workstation Pro and VMWare vSphere Essentials Kit.

1) Other VM software packages may be considered subject to Contractor providing documented success with other VM software packages and subject to approval by Engineer.

2. Anti-Virus, with at least (3) year subscription. Provide an anti-virus package that is compatible with the virtual machine and SCADA software applications. Anti-virus to be installed on both Host and VM.
3. Rockwell Automation RSLogix 500, version 12.0.1, fully licensed. To be installed on Windows 10 VM.

2.9 SCADA SOFTWARE PACKAGE

A. The SCADA Software package shall be part of the complete SCADA system, and shall include all required networked hardware.

1. Provide and install SCADA Software package on both Workstations. SCADA system to be installed and run from each Workstation's Windows 10 Virtual Machine (VM). Workstations shall be configured to automatically start and run VM and SCADA software on boot.
2. For bidding purposes, provide SCADA software with unlimited number of I/O points, devices, graphic screens, etc.

B. Core SCADA Functionality: All core SCADA functionality offered, such as communications drivers, graphics capabilities, reporting, historical data storage, trend and alarm displays, and

the development environment shall be offered as a single integrated software package or suite of packages. The software shall be designed with the ability to make changes to the graphics while the system is running. Shutting down the system for graphic changes is not acceptable.

C. Additionally, software will be supplied to augment, or replace functionality of the software package:

1. Additional Operator and HMI Pages including; Graphics, I/O representation and report generation.
2. Remote alarm software capable of:

    a. Acting as a software "autodialer" that will initiate calling from a user defined list of phone numbers and using a synthesized or recorded voice for announcing the specific active alarm(s). Alarm voice, whether synthesized or recorded, must be intelligible and clear.
    b. Generating SMS (text) message annunciation of active alarm(s) simultaneously to a list of user defined numbers.
    c. Automatically emailing annunciation of active alarms to a list of user defined e-mail addresses.

D. Customized Application Programming: Additional SCADA software programming shall include:

1. Configured Graphics Pages: The Owner shall be provided with graphics pages as required to access each site and the respective device(s).
2. Alarms: The Owner shall be provided with device level alarming for each site and connected device(s).
3. Trends: The Owner shall be provided with customizable trend charts and tables indicating trends by site and connected device(s). Values shall be scaled per device and quantity measured.
4. Historical Reporting: The Owner shall be provided with customizable historical reports for each site and connected device(s) indicating trend values, min/max values, totals, and device specific information.
5. Development: The Contractor shall coordinate with the Owner for specific design requirements prior to commencing work. The SCADA Contractor shall provide a 50% and 100% design meeting after initial coordination meeting with Owner. Final 100% design meeting shall occur within 60 calendar days of successful review of SCADA system submittals.

E. Communications:

1. Description: The SCADA software shall be capable of communicating to PLCs and other devices on the network (both local and remote).
2. Communication failure at either Workstation shall not affect operation of the other Workstation. Each Workstation shall function independently.
3. Communications failure at any node (site) shall not render that node or any other nodes inoperable. Each node shall function independently using their locally stored programs.

4. General communication capabilities. The SCADA software shall have the following communications capabilities:

    a. Support for redundant communication paths to field controllers, and provision for automatic changeover to the standby path in the event of a communications failure.
    b. Built in diagnostic alarms shall be provided with the system that will automatically notify the operator of the failure of any communications path both locally and remotely.
    c. A package of communication drivers that shall include the following as a minimum:

        1) Modbus TCP
        2) EtherNet Industrial Protocol (EtherNet/IP)

5. Communication re-establishment: Upon re-establishment of communications after a failure, all historical alarm, event, and trend data archived by one Workstation shall be automatically synchronized/backfilled into the other Workstation.

F. Security:

1. Description: Security features shall be fully integrated to allow only users with appropriate security levels access to individual parts of the system.
2. Security Capabilities: The SCADA software shall have the following:

    a. Encrypted passwords that are verified at each node and at the server side.
    b. Passwords shall be hidden in both the configuration and runtime environments to ensure that personnel cannot access another account without authorization.
    c. Monitoring and logging of each Operator Interface and of each user. This shall include all operator control actions where inputs or outputs are forced, modifications are made and system log in and log out with time and date stamps. The sequence of actions shall be viewable within the SCADA package and also stored in an external open file format (e.g. txt, csv, dbf, sql) for later analysis.
    d. Automatically log out a user after an adjustable time period. Logging out a user will only cause the system to revert to a view only security status. Logging out will not shutdown any node or interface.
    e. A minimum of 6 privilege levels shall be available for each user. The software shall ensure that a user has access to all tasks for his privilege level. If the user does not have the correct privilege for a task a message will indicate insufficient privilege and log the attempt at the SCADA System Server.

G. Graphical Displays

1. The SCADA software shall have the following graphical display features:

    a. Unlimited number of graphical displays.
    b. Capable of a minimum of 2000 analog variables, with real time updates of less than 500ms (for all data to appear or change on the page).
    c. Capable of automatically re-sizing to match the screen resolution of the computer on the network, irrespective of the resolution the pages were developed in or configured for, and irrespective of whether vector or bitmap graphics are used on

the page, without shutting down the SCADA software, without recompiling, and without having multiple copies of graphic pages for different resolutions.

d. Support full 32 bit graphics, and capable of displaying images from third party packages for use within the SCADA displays, including animating and vector graphic images.

e. Capable of pop-up windows for trends, loops, device status, and device control by clicking on hot spots or objects on the main graphics page. Simultaneous opened popup display windows shall be supported by the graphics display system.

2. Dynamic Objects: Dynamic objects are symbols that visually change when a property, tag or expression changes. Dynamic objects shall have a series of properties that can be used independently or concurrently. Each dynamic object shall have the following properties:

a. Horizontal, Vertical and Rotational movement
b. Up, Down, Left or Right Level Fill
c. Gradient Level Fill
d. On-Off, Multi-State, Integer, Threshold or Gradient Color Change
e. Horizontal and Vertical Size
f. Visibility
g. Keyboard Input
h. Touch (Mouse Up, Down, While Down) input
i. Horizontal and Vertical or Rotational Slider
j. Ability to disable the object based on security levels.
k. Popup information in a "tool tip" form by rolling the mouse over the object

H. Alarms

1. Description: Alarms are meant to alert and operator of an abnormal condition. They are logged, and require operator intervention.
2. General Alarm functionality: The alarm functionality shall have the following:

a. No software limit on the number of alarms supported
b. Acknowledgement on one operator interface terminal shall be globally acknowledged and as such shown as Acknowledged on all operator interface terminal s. This shall be configured as one common database, with no other programming necessary to enable global acknowledgment of alarms from any node in the network.
c. Alarm pop up displays shall expire upon alarm event being cleared at any of the nodes within the network.

3. Alarm Types: The SCADA software shall monitor analog and discrete variables and calculated conditions, and determine if the variable is in an alarm condition. The SCADA software shall perform the following:

a. All analog alarm conditions shall have adjustable dead bands and delay timers to minimize nuisance alarms. All analog alarm properties shall be adjustable without the need to shut the system down. For each Analog Tag, an alarm for each of the following conditions shall be assignable:

1) Low

2) High
3) Deviation Low
4) Deviation High
5) Rate of Change
6) Device Fail
7) Device Level Assignable Alarm
8) Communications Loss

b. Discrete alarms shall have an assignable alarm for each of the following:

1) Variable ON
2) Variable OFF

c. Multi-Digital Alarms based on a combination of discrete tags. Any combination of states of the discrete tags may be configured to be an alarm. Furthermore, a new alarm signal shall be initiated whenever a new alarm state is encountered.
d. All alarm processing shall use time and date stamping based on origin of alarm and clearing of alarm.

4. Alarm Display: Alarm display shall have the following:

a. Depending on user's log-in privileges, it shall be possible to display or acknowledge any alarm and/or the most recent alarm on any page.
b. Alarm shall be configurable in multiple levels. The color of the text of the alarm message shall indicate priority. Text color shall be determined in initial design review meeting.
c. Sound indication for each alarm category shall be configurable. This must be possible at each node via internal or external speaker. The sound indication shall support the playing of any standard .WAV and .MP3 file.
d. Provided with a standard alarm user modifiable display page. The alarm page shall allow for scrolling of alarms, and acknowledgment of individual alarms or all alarms on the page.
e. Possibility to display the following information for each alarm as it appears on an alarm display page:

1) Alarm Tag Name
2) Alarm Description
3) Value of the Variable
4) Alarm Status - Disabled, Acknowledged, Unacknowledged
5) Alarm Category or Priority
6) Time & Date
7) Value of associated tags, devices or results of associated calculations.
8) User comments, where alarm is to be locked out by authorized user.

f. Based on user's privileges, it shall be possible to disable alarms on individual basis, by page or by alarm category or all alarms. A disabled alarm page shall indicate to every user which alarms have been disabled and which user disabled the alarm with user incorporated comments, including area for description of lockout purpose.

g. Based on user's privileges, it shall be possible for user comments to be attached to any alarm. These comments shall either be displayed with the alarm or by clicking on the alarm.
h. Possibility to automatically display any graphic display when an alarm occurs or to dynamically change the appearance of any graphical object based on whether an alarm is On, Off, Acknowledged, Communications Error or Disabled.
i. A mechanism for operators to dynamically define filtering of alarms by alarm name, tag name, date/time range, state or type.

5. Alarm Logging: Alarms that are logged to disk shall be viewable while the system is online or offline without interrupting data collection. The software shall not limit the number of alarms logged to disk. The alarm logging shall be capable of logging an instantaneous burst of alarms without losing any single alarm notification.

I. Trends

1. Description: Trends are a collection of data points over time. When viewed over time, the trends will indicate general progression of the data.
2. General Trend Functionality: The software shall have the following functionality.

a. The number of trends collected shall not be limited by the software.
b. The software shall be capable of logging historical trend information at configurable sample periods from 1 Millisecond to 24 Hours.
c. Trend data shall be stored in a file system with the sample period, file location, privilege, owner and area being user definable individually for each trend. File names and paths shall support file names up to 255 characters in length.
d. Every tag defined in the system configuration shall be trended. Each trend shall contain a minimum of 2 years historical data at a 10 minute sample rate. The trends shall be maintained online for operator call back without the need to backup or restore history files.

3. Trend Display: The software shall have the following in its native functionality:

a. Each operator and login shall be able to view fully customized trend pages. These pages shall be customizable on line by each user in a drop down menu fashion. Any setting available to be made in a configuration environment shall be available to the user to modify the trend graphs in run time. These include the color, scaling, pen selection as examples.
b. Line graphs with time on a linear, continuous horizontal or vertical axis and the trended variable on the vertical or horizontal axis. Resolution of each graph shall be to within 0.1% of full scale.
c. Where more than one variable is displayed on the same graph, the pen color of each variable and associated information shall be displayed in a different color.
d. Each trend graph shall be capable of displaying a minimum of 12 trend pens with adjustable time base to one second samples and shall be capable of viewing the entire archived trend history.
e. Each pen shall display individual ranges and engineering units. Each pen shall be scalable for display purposes independent to each other pen displayed on a page.
f. Include the capability to pan backward and forward within a selected time range to read the exact value of any displayed variable, by selecting a point on the graph or

chart. The system shall display historical information as far back in time as desired, with all information being displayed within 1 second.

g. The software shall provide "zoom" and "pan" facilities for both the trended variable range and the time axis range. The "zoom" facility shall allow an operator to compress or expand the axis range whilst the "pan" facility shall allow an operator to shift the origin of the axis. The software shall allow a user to define any zoom area by dragging a mouse across the trend.

h. The software shall make available trending data from a historical database for export to disk files or external databases. It shall be possible to define the section of the trend to be exported by clicking and dragging the mouse across the trend. Data shall be portable to csv, dbf or txt formatted files. It shall also be possible to export any portion of the historical trend database via ODBC, DDE, dbf, CSV and TXT formats.

J. Development Environment

1. Description: The development environment is the area that allows generation of graphic screens, alarms screens, tag database, trend screens etc.
2. General Development Environment Functionality: The SCADA software shall include a development environment with the following:

a. An integrated development package utilizing menu driven, fill in forms style configuration to develop the runtime system.
b. All development functions shall be available at the SCADA System Server node.
c. A utility to back-up or restore an entire database including all graphic displays, configuration data and source code, as well as online configuration (such as menu navigation, trend groups and alarm groups), via a simple point and click method shall be provided. The backup/restore utility shall prompt the user prior to over writing any existing files. The utility shall employ automatic file compression and decompression.
d. Ability to import field controller tag definitions shall be included as a standard feature. Automatic updating upon a change of a definition in the device tag names, addresses, ranges etc. will automatically be imported into the SCADA software database. In addition it shall be possible to manually initiate the import of tag definitions at any time. The Tag import function shall be user configurable such that a user can specifically define which definition fields must not be overwritten or define how the import will operate. The import function shall support generic OPC data sources and CSV file imports in conjunction to native field controller programming software database imports.

K. Graphics Builder

1. Description: The graphic builder allows for development of graphic screens.
2. General Graphic Builder functionality: The graphics builder shall be interactive and menudriven, requiring no programming. It shall consist of the following:

a. Directly import graphics and text in the following file formats:

1) CAD DXF
2) BMP
3) Windows Meta File WMF

4) JPG
5) GIF
6) TIF

b. The graphics builder shall be capable of creating screens composed of both static and dynamic objects. To create these objects, the software shall provide sample screens and a set of standard shapes in a library. The developer shall be able to include these symbols by reference, or create new symbols/objects.

L. Custom Scripting

1. Description: The scripting language shall be used to develop custom routines, and algorithms not supplied as part of the standard package.
2. General Custom Scripting Functionality: The SCADA software's scripting functionality shall include the following:

a. An integrated high level language specifically designed for SCADA applications that shall be inherently multi-tasking and multi-threading.
b. Fully integrated and multi-threaded Visual Basic (VB) scripting.
c. Access to all field tags, alarms, graphics displays, database and ASCII files. The languages shall include functions with clear and precise syntax. The languages shall support user written functions and function libraries supported by the computer's operating system. The language shall have the capability to export or import data from other applications.
d. Creation of calculated (inferred) variables based upon formulae including constants, measured variables and other calculated variables. All facilities available for logging, reporting, trending, monitoring, controlling, alarming and displaying measured variables shall also be available for calculated variables.

3. Support of mathematical and Boolean operators.
4. Support for mathematical functions.
5. Prevention of any functions from interfering with proper SCADA functionality.
6. Permit users to create their own functions and integrate them. All functions shall be reusable. It shall be possible to call the same function multiple times from different locations, with different parameters simultaneously.
7. Provisions to run functions automatically on start up, on page entry, on page exit, while a page is open, on button down, while button down, embedded in reports, alarm on, alarm off, on any keystroke, any keyboard entry on any mouse button click, etc.

2.10 INDUSTRIAL ROUTER (VPN/FIREWALL HARDWARE)

A. Provide and install, where required, rugged and industrially rated router/security devices for allowing remote access to the sites from the Master and Remote SCADA Workstations as well as remote access into the Master or Remote SCADA Workstations from other, non-SCADA network sites (“home”). Devices shall be capable of providing a secure, Virtual Private Network (VPN) and Firewall functionality.

B. Acceptable Manufacturers:

1. Cisco Catalyst Series

2. Hirschmann EAGLE Series
3. Phoenix-Contact mGuard Series
4. Red Lion, Sixnet Series
5. Similar units by other manufacturers may be considered for use on this project based on a comparison to these lines. Approval of substitutions is solely at the discretion of the Engineer.

PART 3 - EXECUTION

3.1 GENERAL

A. Install equipment and materials in a neat and workmanlike manner and align, level, and adjust for satisfactory operation. Install equipment so that all parts are easily accessible for inspection, operation, maintenance, and repair.

B. Work and wiring inside existing panels shall be neat and orderly. Utilize cable ties and adhesive backed cable tie mounting pad for clean appearance. Use existing wireway for routing of like voltage (AC with AC, DC with DC) conductors when available.

3.2 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Protection During Construction: Throughout this Contract, the Contractor shall provide protection for materials and equipment against loss or damage and from the effects of the weather. Prior to installation, store items in indoor, dry locations. Provide heating in storage areas for items subject to corrosion under damp conditions.

B. Material and Equipment Installation: Follow manufacturer's installation instructions explicitly, unless otherwise indicated. Wherever any conflict arises between manufacturer's instructions, and the Contract Documents, follow Engineer's decision, at no additional cost to Owner. Keep copy of manufacturer's instructions on the job site available for review at all times.

C. The Contractor shall bear ultimate responsibility and shall provide for the supply, installation, adjustment, and startup of a complete, coordinated System that shall reliably perform the specified functions.

D. The Contractor shall make all final power and signal connections (hydraulic, pneumatic, and electric) to all elements provided under this section. The Contractor shall verify and certify by written notice to the Engineer, the correctness of final signal connections and the correctness of

adjustment for all elements provided under this section and all elements interfaced with the System

E. All conduits are provided and installed under Division 26 - ELECTRICAL.

F. All wiring and cables, with the exception of certain specified special control cables, are provided and installed under Division 26 - ELECTRICAL. Specific special control cables as specified in this section shall be provided and installed under this section.

G. Cleaning and Touch-up Painting: Keep premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from premises and from interior and exterior of all devices and equipment. Touch-up scratches, scrapes, and chips in interior and exterior surfaces of devices and equipment with finishes matching as nearly as possible the color, consistency, and type of surface of the original finish.

3.4 ELECTRICAL POWER AND SIGNAL WIRING

A. Control and signal wiring external to the panels and all power wiring shall conform to the requirements of Division 26 - ELECTRICAL.

1. Signal Connections: 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, unless otherwise shown, specified, or required for specific installation locations (such as wet well sensors). Flexible cable, receptacle and plug assemblies shall be used only where shown or specified.

B. Control and signal wiring in panels shall be restrained by plastic ties or ducts.

1. Hinge wiring shall be double secured at each end with mechanically fastened, not adhesive, tie blocks or straps.
2. Hinge crossings shall be either longitudinal crossings with a minimum length of 12 inches, so that any bending or twisting will be around the longitudinal axis of the wire, or loop crossings with a minimum loop diameter of 6 inches.
3. The entire length of wire in the bend area, (between the tie blocks) shall be protected from abrasion with either convoluted tubing or spiral wrap.
4. Wire bundles that pass-through holes shall be protected from abrasion with either grommets or sleeves.
5. Wires that pass across edges of sheet metal shall be protected from abrasion.

C. Arrange wiring neatly, cut to proper length, and remove surplus wire.

D. Use the manufacturer's recommended tool with the proper sized anvil for all crimp terminations. No more than two wires may be terminated in a single crimp lug and no more than two lugs may be installed on a single screw terminal.

1. All crimp lugs used in applications with two wires terminated in a single crimp lug shall be rated by the manufacturer for multiple wire use.

E. Wiring shall not be spliced or tapped except at device terminals or terminal blocks.

3.5 TESTING, START-UP, AND TRAINING

A. All elements of the System shall be tested to demonstrate that the System satisfies all of the requirements of the Specifications.

B. The Contractor shall provide all special testing materials and equipment.

C. The Contractor shall coordinate all of his testing with the Engineer, Owner, and all other associated contractors.

D. Within 12 weeks after award of the contract, and no later than 60 days prior to the testing, the Contractor shall prepare and submit to the Engineer for review, a detailed description of the test procedures proposed to demonstrate conformance of the System to the Specifications and the report forms to be used for recording the test results. The testing procedures shall be designed by the Contractor to duplicate normal operating and all alarm conditions. The Contractor shall ensure that the equipment and facilities are not damaged during testing. The decision of the Engineer upon the acceptability of the test procedures and report forms shall be final.

E. As a minimum, the testing shall include the following:

1. Operational Acceptance Tests

    a. The objective of these tests is to demonstrate that the System is READY for final operation.
    b. The System shall be checked for proper installation, adjustment, and calibration on an “element-by-element” basis to verify that it functions as specified and that all terminations have been made correctly.
    c. All discrete element set points shall be adjusted and checked for proper operation (e.g., interlock function, contact closure on rising/falling P.V., etc.).
    d. All analog loops shall have three-point (0%, 50%, 100%) calibrations performed.
    e. All initial controller tuning constants shall be adjusted to preliminary settings as recommended by the manufacturer.
    f. The "Operational Acceptance Tests" shall be completed prior to starting the "Functional Acceptance Test". The actual testing program shall be conducted in accordance with prior approved procedures and shall be documented.

2. Functional Acceptance Tests

    a. The objective of these tests is to demonstrate that the System operates correctly and complies with the specified performance requirements. All data points shall be tested by activating the field elements and verifying proper System response. The Contractor shall provide a minimum two (2) days Functional Acceptance Testing by qualified personnel. One day of testing shall constitute eight (8) hours of on-site work. During this period, the Contractor’s personnel shall operate the System under normal and all alarm conditions to simulate all operating modes of all equipment.
    b. A witnessed "Functional Acceptance Test" shall be performed on the System. Each function shall be demonstrated to the satisfaction of the Engineer and Owner.

c. Each instrument and final element shall be field calibrated in accordance with the manufacturer's recommended procedure and then tested in accordance with the Contractor's approved test procedure. Data shall be entered on the applicable test form at the time of testing. Alarm trips, control trips, and switches shall be set to initial values. Final elements shall be checked for range, dead-band, and speed of response. Any component that fails to meet the required tolerances shall be repaired by the manufacturer or replaced, and the above tests repeated until the component is within tolerance.

d. Adjust tuning constants as required for proper System operation. Provide final tuning constant information in tabular form for inclusion in the Operation and Maintenance Manuals.

e. Each test shall be witnessed and signed off by the Contractor and the Owner's representative upon satisfactory completion.

f. The actual testing program shall be conducted in accordance with the prior approved procedures and shall be documented as required.

g. The Contractor shall notify the Engineer and the Owner's representative, and submit the results of the "Operational Acceptance Tests," at least 1 week prior to the date of the "Functional Acceptance Test".

F. In addition to the test procedures, the Contractor shall provide a minimum of 2 day(s) of System training. The Contractor shall also provide an outline for the proposed training that covers basic software and equipment training, operator training, System maintenance training, and programming training. Identify the course content and the time to be spent on each subject area.

PART 4 - MEASUREMENT AND PAYMENT

4.1 BASIS

A. See Technical Specifications "Measurement and Payment" for a description of the basis of measurement and payment for the Work performed under this Contract.

END OF SECTION 26 09 00

DRAWINGS

(Bound Separately)