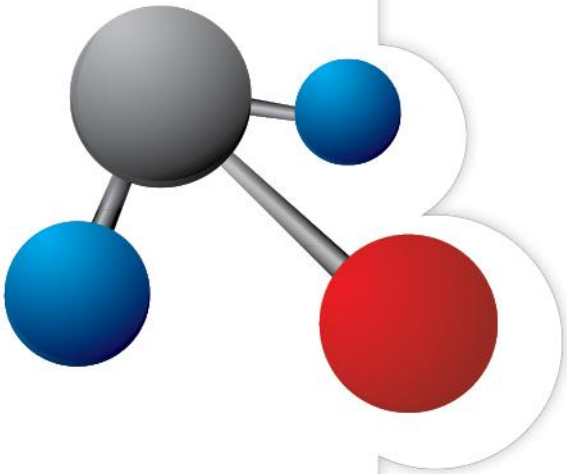
Williston Water Resource Recovery Facility (WRRF) Reuse Project



PREPARED FOR:

City of Williston, North Dakota

AE2S Project No. P00581-2025-003

April 2026

PROJECT MANUAL

Advanced Engineering and Environmental Services, LLC
1102 Main Street,
Williston, ND 58801
Ph: 701-774-3080 Web: www.AE2S.com

SECTION 00 01 05
CERTIFICATIONS PAGE

PLANS AND SPECIFICATIONS FOR WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

CITY OF WILLISTON

WILLISTON, NORTH DAKOTA



CIVIL ENGINEER

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of North Dakota.

Kevin M. Johnson, PE
ND PE #4964

Responsible for Divisions 00, 01, 03, 09, 31, 32, 33 and Sections 40 05 19, 40 05 58, and 40 73 13.



ELECTRICAL ENGINEER

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of North Dakota.

Adam Wahler, PE
ND PE #7886

Responsible for Divisions 26 and 40 (Except Sections 40 05 19, 40 05 58, and 40 73 13)

END OF SECTION

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DIVISION 00
PROCUREMENT AND CONTRACTING REQUIREMENTS

SECTION 00 11 13
ADVERTISEMENT FOR BIDS

NOTICE IS HEREBY GIVEN, that the City of Williston, North Dakota, City Auditor will receive sealed Bids at the Auditor's Office until **3:00 pm**, local time, on the **27th day of May 2026**, for the purpose of furnishing all materials, labor, equipment, and skill required for the construction of the Williston Water Resource Recovery Facility (WRRF) Reuse Project, and incidental items, for said City, as is more fully described and set forth in the Plans and Specifications which are now on file in the office of the City Engineering Department. Bids can be mailed to the City of Williston, City Hall, PO Box 1306, Williston, ND 58802 - 1306. Bids will be opened and read aloud a short time after receiving.

The Work is comprised of one (1) Contract: **Contract No. 1 – General Construction**. The Work for the Contract is generally described as follows:

Contract No. 1: General Construction:
Work generally consists of a reuse water pipeline consisting of furnishing and installing the following approximate quantities: 30,000 feet of 8-inch DIPS, DR 11 HDPE installed by open-cut and directional drilling methods; various fittings; various gate valves; air release/vacuum assemblies; drain connections; surface restoration; installation of an Owner supplied buried pump station; and a water level/pump control system; and all associated fittings and appurtenances, restoration, flushing and testing, signage, seeding, and gravel.

All bids shall be contained in a sealed envelope plainly marked showing that such envelope contains a Bid for the Project. Also refer to Section 00 21 13 - Instructions to Bidders for preparation of bid information.

All Bids shall be prepared according to the Instructions to Bidders contained within the Project Manual. Each Bid shall be accompanied **by a separate envelope** containing a Bid Security in the form of a Bidder's Bond executed by the Bidder as principal and by a surety company authorized to do business in the State of North Dakota, payable to the City of Williston, in a sum equal to five percent (5%) of the full amount of the Bid. A certified check in lieu of a surety company in the amount of 5% of the total project cost will not be accepted. This is to serve as a guarantee that the successful Bidder will enter into a Contract within fifteen (15) days of Notice of Award, in accordance with the terms of the principal's Bid and Contractor's Bond as required by law and regulations and determinations of City of Williston for the performances of such Work. Only Bids that are accompanied by such a Bond will be considered.

Contracts shall be awarded on the basis of the low Bid submitted by a qualified, responsible, and responsive Bidder deemed most favorable to the City's interest.

The City of Williston reserves the right to reject any and all Bids, to waive any informality in any Bid, to hold all Bids for a period not to exceed forty-five (45) days from the date of opening Bids.

All Work shall be performed in accordance with the Bidding Documents on file in the Office of City of Williston, ND where they may be seen and examined. Bidders must be licensed for the full amount of the Bid as required by North Dakota Century Code 43-07-05. Each Bid shall contain a copy of the Contractor's license or certificate of renewal thereof issued by the Secretary of State in the outside envelope. All Bids must be submitted on the Bid Form furnished by the Engineer. No Bid will be read or considered that does not fully comply with the above provisions and other provisions contained within the Bidding Documents, and any deficient Bid submitted will be returned to the Bidder unopened.

Contracts shall be awarded on the basis of the low Bid submitted by a responsible and responsive Bidder deemed most favorable to the Owner's interest.

All Bids shall be contained in a sealed envelope plainly marked showing that such envelope contains a Bid for the Project. In addition, the Bidder shall place upon the exterior of such envelope the following information:

1. Project Name and Work covered by the Bidder (General).
2. The name of the Bidder.
3. Acknowledgement of all Addenda.
4. Separate envelope containing documentation as noted in Section 00 21 13 - Instructions to Bidders.

Complete digital project Bidding Documents are available at www.questcdn.com. You may download the digital plan documents for Thirty Dollars ($30.00) by inputting Quest project #10148613 on the website's Project Search page. Please contact QuestCDN.com at 952-233-1632 or info@questcdn.com for assistance in free membership registration, downloading, and working with this digital project information.

Copies of the Bidding Documents may also be seen and examined at the office of the Engineer, **Advanced Engineering and Environmental Services, LLC**, 1102 Main Street, Williston, ND 58801. The Bidding Documents are available in the form of printed plans and specifications and/or PDF flash drives from Advanced Engineering and Environmental Services, LLC. The costs are $40.00 for flash drives and $300.00 for printed documents, for each set of Documents obtained. Payment for Bidding Documents is **NON-REFUNDABLE**. All Work shall be done according to the Bidding Documents. Bidding Documents may also be examined at the offices of AE2S in Bismarck, Grand Forks, and Williston, ND; Maple Grove, MN, and Builders' exchanges in Grand Forks, Bismarck, Minot, Grand Forks, and Fargo, ND, in Rapid City, SD, and in Minneapolis, MN.

The work for Contract No. 1 must be completed no later than the following:

Substantial Completion: **May 1, 2027**
Final Completion: **June 1, 2027**

Intermediate Completion Milestones: Refer to the Project Specifications.

All Bids will be made on the basis of cash payment for such work. After Bid opening, the Owner will return Bid security of all except the three lowest responsible Bidders. When the Contract is awarded, the remaining unsuccessful Bidder's Bonds will be returned. The Owner reserves the right to reject any or all Bids, and further reserves the right to award the Contract in the best interests of the Owner. The Owner reserves the right to hold the three (3) low Bids for a period of forty-five (45) days after the date of the Bid opening to complete financial arrangements.

By: /s/David Juma
City Engineer
City of Williston, Williston, ND

END OF SECTION

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SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

ARTICLE 1 - DEFINED TERMS

1.01 Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof:

A. *Bidder* - The individual or entity who submits a Bid directly to Owner.

B. *Successful Bidder* - The lowest responsible Bidder submitting a responsive Bid to whom Owner (on the basis of Owner's evaluation as provided herein) makes an award.

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents may be obtained from the Engineer. The cost, as stated in the Advertisement for Bids, is **NON-REFUNDABLE**.

2.02 Complete sets of Bidding Documents must be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.03 Owner and Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, Bidder shall submit written evidence such as previous experience, present commitments, and such other data as may be called for below.

A. Bidders shall have qualifications performing work of similar type and size as this Project. Bidder shall have successfully completed a minimum of five (5) projects of similar complexity as this Project and five (5) years minimum experience. All bidders shall submit, upon request, a thoroughly completed Bidder Qualifications Form. Failure to submit the above information on the provided form may be cause for rejection of the Bid.

B. The Owner reserves the right to reject any Bid, if the experience qualifications submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the agreement and to complete the work contemplated therein.

C. The Owner reserves the right to disqualify a superintendent based on past work history.

D. The Owner reserves the right to disqualify a bidder based on work history or any other factors impacting the bidder's status as a responsible bidder.

E. A Contractor's license or renewal form must be submitted with the Bid.

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

4.01 Subsurface and Physical Conditions

A. The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Bidding Documents.

2. Those drawings of physical conditions in or relating to existing surface and subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Bidding Documents.

4.02 Underground Facilities

A. The Supplementary Conditions identify those reports and drawings relating to existing Underground Facilities at or contiguous to the Site, if any, that the Engineer has used in preparing the Bidding Documents.

4.03 Hazardous Environmental Condition

A. The Supplementary Conditions identify those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that Engineer has used in preparing the Bidding Documents.

B. Copies of reports and drawings referenced in paragraph 5.03.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in paragraph 5.03.B of the General Conditions has been identified and established in paragraphs 5.03.C and 5.03.D of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or indicated in such drawings.

4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated conditions appear in paragraphs 5.03, 5.04 and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work appear in paragraph 5.06 of the General Conditions.

4.05 On request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, test, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.06 Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other Work that is to be performed at the Site by Owner or others (such as utilities and other prime Contractors) that relates to the Work for which a Bid is to be submitted. On request, Owner will provide to each Bidder for examination access to or copies of Contract Documents (other than portions thereof related to price) for such other Work.

4.07 It is the responsibility of each Bidder before submitting a Bid to:

A. examine and carefully study the Bidding Documents, including any Addenda and the other related data identified in the Bidding Documents;

B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, or performance of the Work;

D. carefully study all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 5.03 of the General Conditions, and carefully study all reports and drawings of a Hazardous Environmental Condition, if any, at the Site which have been identified in the Supplementary Conditions as provided in paragraph 5.06 of the General Conditions;

E. obtain and carefully study (or assume responsibility for doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at

or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;

F. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;

G. become aware of the general nature of the Work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;

I. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and

J. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

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

ARTICLE 5 - PRE-BID CONFERENCE

5.01 A Pre-Bid conference will not be held for this Project.

ARTICLE 6 - SITE AND OTHER AREAS

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

ARTICLE 7 - INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than ten (10) days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

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

ARTICLE 8 - BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five (5) percent of Bidder's maximum Bid price and in the form of a Bid Bond on the form attached, and issued by a surety meeting the requirements of paragraph 6.01 of the General Conditions.

8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within fifteen (15) days after Notice of Award, Owner may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of the three (3) lowest Bidders shall be retained by Owner until the earlier of seven (7) days after the Effective Date of Agreement or sixty (60) days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

8.03 Bid security of Bidders other than the three (3) lowest Bidders shall be returned within fifteen (15) days after the Bid opening.

ARTICLE 9 - CONTRACT TIMES

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

ARTICLE 10 - LIQUIDATED DAMAGES

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

ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute, “or-equal”, “approved equivalent”, or “prior approved equivalent” items. Whenever it is specified or described in the Bidding Documents that a substitute, “or-equal”, or “approved equivalent”, or “prior approved equivalent” item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, Bidder may make application to Engineer for approval of the substitute, “or-equal”, or “approved equivalent” material or equipment. Engineer will consider request for approval ONLY if submitted at least ten (10) days prior to the date for receipt of Bids. Each such request shall include the name of the material or equipment for which it is to be considered as a substitute, “or-equal”, or “approved equivalent” and a complete description of the proposed item including drawings, cuts, performance, and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or Work that incorporation of the proposed item would require shall be included. The burden of proof of the merit of the proposed item is upon the Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

12.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five (5) days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such lists shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Engineer after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, in which case apparent Successful Bidder shall submit an acceptable substitute, Bidder's Bid price will be increased (or decreased) by the difference in the cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the contract award.

12.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in paragraph 7.06 of the General Conditions.

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

ARTICLE 13 - PREPARATION OF BID

13.01 The Bid form is included with the Bidding Documents.

13.02 All blanks on the Bid form shall be completed by printing in ink or by typewriter and the Bid signed. A Bid price shall be indicated for each Contract and Bid item listed therein, or the words "No Bid," "No Change," or "Not Applicable" entered.

13.03 Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The Bid shall be attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

13.04 Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature). The official address of the partnership shall be shown below the signature.

13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown below the signature.

13.06 A Bid by an individual shall show the Bidder's name and official address.

13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid form. The official address of the joint venture must be shown below the signature.

13.08 All names shall be typed or printed in ink below the signatures.

13.09 The Bid shall contain an acknowledgement of receipt of all Addenda, the numbers of which shall be filled in on the Bid form. Failure to do so may be cause for classifying the Bid as non-responsive and the Bid not being opened.

13.10 The address and telephone number for communications regarding the Bid shall be shown. If the Bidder has an e-mail address, that e-mail address shall be included for communication purposes.

13.11 A copy of Contractor's License or Certificate of Renewal as issued by the Secretary of State to do business in the State of North Dakota must be enclosed in the bid bond envelope as required under Section 43-07-12. All bids and proposals for the construction of any public contract project subject to the provisions of this chapter shall contain a statement showing that the bidder or Contractor is duly and regularly licensed hereunder. The number and class of such license then held by such public Contractor shall appear upon such bid or proposal. No contract shall be awarded to any Contractor unless he is the holder of a license in the class within which the value of the project shall fall as hereinbefore provided. A Contractor must be the holder of a license at least ten days prior to the date set for receiving bids to be a qualified bidder. The bid shall be submitted in a sealed envelope upon which there is disclosed the following information:

A. The class of license held by the bidder;

B. The number of the bidder's license;

C. The name of the person, firm or corporation submitting the bid;

D. Date on which license was issued or renewed.

A bid submitted without this information shall not be considered and shall be returned to the bidder.

ARTICLE 14 - BASIS OF BID; EVALUATION OF BIDS

14.01 General

A. Bidders shall submit a Bid on individual Contracts or any combination of Contracts as set forth in the Bid Form.

1. Bidders may submit a Bid for any of the separate Contracts or any combination of Contracts as provided in the Bid Form. Submission of a Bid on any Contract signifies Bidder's willingness to enter into a Contract for that section alone at the price offered.

2. Bidders offering a Bid on one or more contracts must be capable of completing the Work within the time period stated in the Agreement.

14.02 Unit Price

A. Bidders shall submit a Bid on a unit price basis for contracts established as unit price contracts as set forth in the Bid Form.

B. The total of all estimated prices will be determined as the sum of the products of the estimated quantity of each item and the unit price Bid for the item. The final quantities and Contract Price will be determined in accordance with paragraph 13.03 of the General Conditions.

C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

14.03 Lump Sum

A. Bidders shall submit a Bid, on a lump sum basis, on individual Contracts, any combination of Contracts, or the Combined Contract as set forth in the Bid Form.

1. Submission of a Bid on any Contract signifies Bidder's willingness to enter into a Contract for the Contract(s) indicated by the Bidder on the Bid Form at the price(s) offered.

2. Bidders offering a Bid on one or more Contracts must be capable of completing the Work with the time period stated in the Agreement.

B. Discrepancies between words and figures will be resolved in favor of the words.

C. Bidders shall submit a Bid on a lump sum basis for the Base Bid and include a separate price for each Alternate described in the Bidding Documents and as provided for in the Bid Form. The price for each Alternate will be the amount added to or deleted from the Base Bid if Owner selects the Alternate.

14.04 The Bid price shall include such amounts as the Bidder deems proper for overhead and profit on account of cash allowances, if any, named in the Contract Documents as provided in paragraph 13.02 of the General Conditions.

ARTICLE 15 - SUBMITTAL OF BID

15.01 Each prospective Bidder is furnished one (1) copy of the Bidding Documents with one (1) separate unbound copy each of the Bid form and the Bid Bond form. The unbound copy of the Bid form is to be completed and submitted with the Bid security and other required documents as described in this article.

15.02 Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Advertisement for Bids. If the Bid is sent through the mail or other delivery system, the sealed envelope and attached Bid security envelope shall be enclosed in a separate sealed envelope, labeled with the notation “Bid Enclosed” on its face and sent to the address below.

15.03 Bidder shall prepare his Bid as follows:

A. Enclose in an opaque sealed envelope:

1. Completed Bid Form.

B. Mark on outside of opaque sealed envelope:

1. “BID ENCLOSED”

2. City of Williston

   Attn: Bid for Williston WRRF Reuse Project

   City Hall

   PO Box 1306

   Williston, ND 58802 - 1306

3. BID FOR: Williston Water Resource Recovery Facility (WRRF) Reuse Project

4. BID FROM: (Name and address of the Bidder)

   Acknowledgement of Receipt of Addenda _____ through _____.

   (Fill in appropriate Addendum numbers.)

   NOTE: Any Bidder who fails to acknowledge receipt of <u>all</u> Addenda <u>on the outside of the Bid envelope</u> may be considered non-responsive and that Bid will not be opened.

C. Attach to outside of sealed opaque envelope containing bid a separate sealed envelope containing the following:

1. Bid Bond. See Section 00 43 13.

2. Contractor's License or Certificate of Renewal.

3. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid and the associated attached Bid Security envelope shall be enclosed in a separate envelope, plainly marked on the outside with the notation "BID ENCLOSED."

4. Non-Collusion Affidavit (00 45 19)

15.04 The lowest, responsible Contractor(s) shall submit the following forms, upon request, within ten (10) days after the Bid to the Engineer.

A. Bidder Qualifications Form. See Section 00 43 29.

B. Contractor Dispute History Certification. See Section 00 45 12.

ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BID

16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

16.02 If within twenty-four (24) hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw the Bid, and the Bid Bond will be returned. Thereafter, if the Work is re-bid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 - OPENING OF BIDS

17.01 Bids will be opened at the time and place indicated in the Advertisement for Bids and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the Bids will be made available to Bidders after the opening of Bids.

ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 19 - AWARD OF CONTRACT

19.01 Owner reserves the right to reject any or all Bids **for any reason**. Owner also reserves the right to waive all informalities and to negotiate contract terms with the Successful Bidder. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

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

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

19.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.

19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the Contract Documents.

19.06 Contracts shall be awarded on the basis of the low Bid submitted by a responsible and responsive Bidder deemed most favorable to the Owner’s interest.

ARTICLE 20 - CONTRACT SECURITY AND INSURANCE

20.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to Performance and Payment Bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by such Bonds and insurance.

ARTICLE 21 - EXECUTION OF AGREEMENT

21.01 When Owner gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the Agreement as attached thereto. Within ten (10) days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten (10) days thereafter, Owner shall deliver one (1) fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

21.02 A performance bond and payment bond, each in the amount of 100 percent of the contract price, with a corporate surety approved by the Owner, will be required as security for the faithful performance and payment of obligation under the Agreement. Attorneys-in-fact who sign the performance and payment bonds must file with each bond a certified and effective dated copy of their power of attorney.

21.03 In the event of the Bidder failing to execute the Agreement, the Owner may at their option consider the Bidder in default, in which case the certified check, bank check, or Bid Bond accompanying the Bid shall become property of the Owner.

21.04 Within ten (10) days after receipt of acceptable performance and payment bonds and the Agreement signed by the Successful Bidder, Owner shall sign the Agreement and return to the Successful Bidder an executed duplicate of the Agreement.

21.05 The Notice to Proceed shall be issued within ten (10) days of the execution of the Agreement by the Owner. A preconstruction conference will be held prior to the issuance of the Notice to Proceed. Should there be any reason why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the Owner and Contractor. If the Notice to Proceed has not been issued within ten (10) days of the execution of the Agreement or within the period mutually agreed upon, the Contractor may terminate the Agreement without further liability on the part of either party.

ARTICLE 22 - SALES AND USE TAXES

22.01 Owner is not exempt from State of North Dakota state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall be included in the Bid.

ARTICLE 23 - RETAINAGE

23.01 Retention of Contractor's securities in lieu of retainage is not acceptable; provisions concerning retainage are set forth in the Agreement.

END OF SECTION

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SECTION 00 26 00
PROCUREMENT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. This section defines the procedures for proposing substitute items by "Prior Approved Equivalent" manufacturers not listed in the specifications

B. Acceptance of "Prior Approved Equivalent" manufacturers will be done by addendum to the bidding documents prior to bid date and time.

1.02 QUALIFICATIONS PACKAGE FOR NON-LISTED "PRIOR APPROVED EQUIVALENT" PRODUCT CONSIDERATION

A. Bidders shall submit a qualification package at least fifteen (15) days prior to the date of receipt of bids for each proposed "Prior Approved Equivalent" manufacturer not already listed as an acceptable or approved “manufacturer” in the specifications, which the Bidder proposes to furnish. Each qualification package shall be bound with protective cover, identified by specification section number and title, and the product manufacturer's name. The Bidder shall submit all qualification packages in a sealed, sturdy box or suitable container.

B. Qualification packages for non-listed "Prior Approved Equivalent" items shall include the following: (if an item does not apply, indicate so in the submittal):

1. Completed Substitution Request Form. A copy of which can be found attached to the end of this section.
2. A complete set of drawings, specifications, catalog cut-sheets, and detailed descriptive material. This information shall identify all technical and performance requirements stipulated on each drawing and in each specification section. Include all items required for shop drawing review.
3. Provide marked-up product information showing side by side comparisons for both the specified products and proposed products
4. Detailed information for all buy-out items such as hardware, motors, bearings, reducers, belts, sheaves, motor controllers and instrumentation.
5. Lists showing materials of construction of all components, including all buy-out items.
6. Manufacturer's recommended spare parts, including all buy-out items.
7. Information on equipment field erection requirements including total weight of assembled components and weight of each sub-assembly.
8. A maintenance schedule showing the required maintenance, frequency of maintenance, lubricants and other items required at each regular preventative maintenance period, including all buy-out items.
9. Electrical requirements and schematic diagrams.

10. Detailed written documentation with discussion of all deviations of equipment, including buy-out items, from the Contract Documents.
11. A list of all process, mechanical, electrical, and structural changes and requirements for incorporating the "Prior Approved Equivalent" into the project.
12. A listing of the manufacturer's history. Unless specified otherwise in applicable specification sections, manufacturer's history is to demonstrate a minimum of three (3) years experience and a minimum of three (3) successful installations of the size and complexity involved in this project. Provide a complete installation list with contact names and telephone numbers.
13. Documentation easily identifying that the proposed substitution meets or exceeds the specified warranties

C. Failure to furnish the preceding information at least fifteen (15) days prior to the date of receipt of bids shall be cause for rejection of a proposed alternate item for use on this project.

D. No "Prior Approved Equivalent" items will be considered unless, in the opinion of the Engineer, they conform to the Contract Documents in all respects, except for make and manufacturer and minor details.

E. The Engineer shall be the sole authority for determining conformance of a proposed "Prior Approved Equivalent" item with the Contract Documents. Except for identification of non-compliance with the specifications, the Engineer will not be required to prove that a "Prior Approved Equivalent" item is not equal to "Basis of Bid" items.

F. Substitutions or modifications to the qualification package will not be considered after opening of Bids.

G. Acceptance of "Prior Approved Equivalent" items and their qualification packages, does not eliminate the need for shop drawing submittals and reviews during construction, nor does it eliminate the requirement that the seller satisfy the requirements of the Contract Documents.

1.03 BID REQUIREMENTS

A. Bidders proposing to furnish "Prior Approved Equivalent" items that require changes to the Contract Documents shall notify the Engineer in writing of all process, mechanical, electrical and structural changes and requirements for incorporating the "Prior Approved Equivalent" into the Project and shall reimburse the Owner for associated redesign costs. Redesign and contract drawing revisions to accommodate the "Prior Approved Equivalent" will be prepared by the Engineer during the shop drawing review

process. Reimbursement shall be based on the Engineer's standard hourly rates plus reimbursable expenses at cost.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

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SECTION 00 26 00 -- ATTACHMENT

SUBSTITUTION REQUEST FORM

Engineer's Project No: P00581-2025-003 **Date:** _____

Project Name: **Williston Water Resource Recovery Facility (WRRF) Reuse Project, City of Williston, ND**

Specification Section	Manufacturer Specified	Proposed Manufacturer

Indicate drawing sheet name in lieu of specification section where applicable.

Vendor/Supplier

Name: _____

Address: _____

Contact: _____ **E-Mail:** _____

Telephone: _____ **Fax:** _____

Reason for Substitution: _____

_____

_____

_____

Does Specification Allow for Substitutions of Proposed Items? Yes: ___ No: ___

Will the Substitution Provide Cost Savings to the Owner? Yes: ___ No: ___

Are Proposed Substitutions Equivalent/Superior to those Specified? Yes: ___ No: ___

Do the Proposed Substitutions meet the requirements of the Specification? Yes: ___ No: ___

Did you submit a complete qualification package as described in Part 1.02.B of Section 00 26 00 with this form? Yes: ___ No: ___

I, _____, accept responsibility for coordination of proposed substitution and accept all additional costs resulting from the incorporation of proposed substitution into the Project. (Proposers Signature Required)

For Architect/Engineer's Use:……..…Comments: _____

Accepted: ___ Not Accepted: ___ _____

No Action Required: ___ _____

Submission: Incomplete: ___ Too Late: ___ _____

Reviewed By: _____ _____

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SECTION 00 41 00
BID FORM

ARTICLE 1 - BID RECIPIENT:

1.01. This Bid is submitted to:

City of Williston
Attn: Bid for Williston WRRF Reuse Project
City Hall
PO Box 1306
Williston, ND 58802 - 1306

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

ARTICLE 2 - BIDDER'S ACKNOWLEDGEMENTS

2.01. Bidder accepts all of the terms and conditions of the Advertisement for Bids and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. The Bid will remain subject to acceptance for forty-five (45) days after the day of Bid opening. BIDDER will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements within fifteen (15) days after the date of Owner's Notice of Award.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.01. In submitting this Bid, Bidder represents, as set forth in the Agreement, that:

A. Bidder examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

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

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

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to Contractor doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

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

H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents and confirms that the written resolution thereof by Engineer is acceptable to Bidder.

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

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 - BIDDER'S CERTIFICATION

4.01. Bidder certifies that:

A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of the Paragraph 4.01D:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of the Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 - BASIS OF BID

5.01. Bidder will complete the Work, whether specifically listed on the BID FORM, shown on the Drawings, or described in the Specifications, in accordance with the Contract Documents for the following price(s):

Unit Price Bid:

Included in the Base Bid for **Contract No. 1 – General Construction** are the following construction items. Quantities included in the Base Bid are shown on the plans and as described in project specifications. The bidder provides the following unit prices for work as described in Section 01 22 00 - Measurement and Payment, Paragraph 1.07. Any deviation from the quantity indicated in the Project Specifications and Drawings, based on actual site conditions, whether add or deduct, shall be handled as an adjustment to the contract price, based on this unit price.

ITEM	ITEM DESCRIPTION	QTY.	UNIT	UNIT PRICE	EXTENDED PRICE
A	Mobilization	1	l.s.	$	$
B	SWPPP/Erosion Control and Sediment Control	1	l.s.	$	$
C	Traffic Control	1	l.s.	$	$
D	Pre-Manufactured Pump Station (Installation Only)	1	l.s.	$	$
E	Connect to Existing 24-inch DIP Effluent Pipeline	1	ea.	$	$
F	Open-Cut Water Main				
	1. 8-inch DIPS DR11 HDPE	16,145	l.f.	$	$
G	Directional Bore Water Main				
	1. 8-inch DIPS DR11 HDPE	12,078	l.f.	$	$
H	Cased Bore				
	1. 8-inch DR11 HDPE w/12-inch Steel Casing	350	l.f.	$	$

	2. 8-inch DR11 HDPE w/12-inch DR 11 HDPE Casing	375	l.f.	$		$	
I	Gate Valves						
	1. 8-inch Gate Valve	24	ea.	$		$	
J	Air Release/Vacuum Valve Assembly	9	ea.	$		$	
K	6-inch Fire Hydrant	1	ea.	$		$	
L	Drain Manhole	5	ea.	$		$	
M	Pressure Sustaining Valve Manhole	1	ea.	$		$	
N	Pressure Reducing Valve Manhole	1	ea.	$		$	
O	Class 5 Aggregate Base	1,250	ton	$		$	
P	Asphalt Paving – Public Street or Driveway	710	s.y.	$		$	
Q	Asphalt Paving – Bike Path	100	s.y.	$		$	
R	Concrete Paving						
	1. 8-inch Concrete – Valley Gutter	50	s.y.	$		$	
	2. 6-inch Concrete – Driveway Apron	170	s.y.	$		$	
	3. 4-inch Concrete – Sidewalk	1,385	s.y.	$		$	
S	Curb and Gutter	1,245	l.f.	$		$	
T	Restoration and Seeding	8.00	acre	$		$	
U	Bollard	8	ea.	$		$	
V	Water Level Control System	1	l.s.	$		$	
W	Drain Pipe Connection to EA Basin	1	l.s.	$		$	

TOTAL BASE BID: **($ _____)**

(Use Figures)

_____

(Use Words)

ARTICLE 6 - TIME OF COMPLETION

6.01. Bidder agrees that the Work will be substantially complete on or before the calendar dates indicated below, and have all Work completed and ready for Final Payment in accordance with paragraph 15.06 of the General Conditions by the below-indicated calendar dates:

Contract No. 1 - General Construction:

A. Refer to Section 00 52 00 – Agreement for the Project Completion Dates

6.02. Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified above in Article 6.01, and to pay OWNER specified liquidated damages as indicated in the Agreement.

ARTICLE 7 - ATTACHMENTS TO THIS BID

7.01. The following documents are submitted with and made a condition of this Bid:

A. Required Bid Security in the form of a Bid Bond (See Section 00 43 13).

B. Completed Bid Form (See Section 00 41 00).

C. Non-Collusion Affidavit (See Section 00 45 19).

D. Contractor's License

ARTICLE 8 - DEFINED TERMS

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

ARTICLE 9 - BID SUBMITTAL

9.01. This Bid is SUBMITTED on _____, 20_____

BY:

If Bidder is:

<u>An Individual</u>

Name (typed or printed):_____

By:_____

(*Individual's Signature*)

Doing business as:_____

<u>A Partnership</u>

Partnership Name:_____

By:_____

(*Signature of general partner – attach evidence of authority to sign)*

Name (typed or printed):_____

A Corporation

Corporation Name:_____

State of Incorporation:_____

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

By:_____

(*Signature – attach evidence of authority to sign)*

Name (typed or printed):_____

Title:_____

Attest:_____

(*Signature of Corporate Secretary)*

Date of Qualification to do business in North Dakota is_____/_____/_____.

A Joint Venture

Name of Joint Venture:_____

First Joint Venture Name:_____

By:_____

(*Signature of joint venture partner – attach evidence of authority to sign)*

Name (typed or printed):_____

Title:_____

Second Joint Venture Name:_____

By:_____

(*Signature of joint venture partner – attach evidence of authority to sign)*

Name (typed or printed):_____

Title:_____

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

BIDDER'S BUSINESS ADDRESS & CONTACT INFORMATION:

Bidder's Business Address: _____

_____

Business Phone No. _____

Business Fax No. _____

Business E-Mail Address _____

State Contractor License No. _____ (If applicable)

Employer's Tax ID No. _____

ADDRESS FOR GIVING NOTICES:

Phone and e-mail address, and Address for receipt of *official communications* if different from Business address and contact information:

_____

_____

END OF SECTION

BID BOND (PENAL SUM FORM)

Bidder Name: **[Full formal name of Bidder]** Address *(principal place of business)*: **[Address of Bidder's principal place of business]**	**Surety** Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Owner Name: **[Full formal name of Owner]** Address *(principal place of business)*: **[Address of Owner's principal place of business]**	**Bid** Project *(name and location)*: **[Owner project/contract name, and location of the project]** Bid Due Date: **[Enter date bid is due]**
Bond Penal Sum: **[Amount]** Date of Bond: **[Date]**	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder	Surety
_____ *(Full formal name of Bidder)*	_____ *(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) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.	

EJCDC® C-430, Bid Bond (Penal Sum Form).
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1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder occurs upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation will be null and void if:

   3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

   3.2. All Bids are rejected by Owner, or

   3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.

6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.

7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

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

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

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SECTION 00 45 19 – NON-COLLUSION AFFIDAVIT

STATE OF _____

COUNTY OF _____

I hereby swear (affirm) under penalty or perjury:

1. That I am the Bidder (if Bidder is an individual), a partner in the Bidder (if Bidder is a partnership), or an officer or employee of the Bidder (if Bidder is a corporation) having authority to sign on its behalf;

2. That the attached Bid or Bids have been arrived at by the Bidder individually and have been submitted without collusion with, and without any agreement, understanding or planned common course or action with any vendor of materials, suppliers, equipment, or services described in the invitation to bid designed to limit individual bidding or competition;

3. That the contents of this Bid or Bids have not been communicated by Bidder or its employees or agents to any person not an employee or agent of the Bidder or its surety on any bond furnished with the Bid or Bids, and will not be communicated to any such person, prior to any official opening of the Bid or Bids; and

4. That I have fully informed myself regarding the accuracy of the statements made in this affidavit.

_____
Signature of Bidder

Subscribed and sworn before me this

_____ day of _____20___

_____
Position

_____
Notary

_____
Company Name

(seal)

_____
Date

END OF SECTION

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NOTICE OF AWARD

DATE: _____

TO: _____
(Contractor)

ADDRESS: _____

_____

PROJECT: **Williston Water Resource Recovery Facility (WRRF) Reuse Project**

CONTRACT FOR: _____

You are notified that your Bid dated _____ for the above Contract has been considered. You are the apparent Successful Bidder and have been awarded a contract for all work under the above referenced project.

The Contract Price of your contract is _____

Four (4) copies of the proposed Agreement accompany this Notice of Award.

You must comply with the following conditions precedent within ten (10) days of the date of this Notice of Award, that is by _____, 2026.

1. You must, immediately, deliver to the ENGINEER four (4) signed copies of this Notice acknowledging its receipt.

2. You must deliver to the ENGINEER four (4) fully executed counterparts of the Agreement including all the Contract Documents.

3. You must deliver with each executed Agreement, Performance and Payment Bonds as specified in the Instructions to Bidders (Article 20), General Conditions (Article 6.01) as may be amended by the Supplementary Conditions.

4. You must deliver with each executed Agreement, Certificates of Insurance as specified in the General Conditions (Article 6) as may be amended by the Supplementary Conditions.

5. You must deliver with each executed Agreement, Current Workmen's Compensation Certificate of Premium Paid.

6. You must deliver with each executed Agreement, Contractor's Certificate of North Dakota Income and Sales Tax Clearance.

After execution of the Agreement, please send all copies of the Contract, along with the above items to the Engineer, **Advanced Engineering and Environmental Services, LLC. (AE2S)**, 1102 Main Street, Williston, ND 58801.

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

Within 15 days after you comply with the above conditions, OWNER will return to you one fully signed counterpart of the Agreement with the Contract Documents attached.

City of Williston
Owner

By: _____
Authorized Signature

ACCEPTANCE OF AWARD

_____
Contractor

By: _____

Title: _____

Date: _____

SECTION 00 52 00 – AGREEMENT

THIS AGREEMENT is dated as of the _____ day of _____ in the year 2026 by and between the City of Williston, PO Box 1306, Williston, ND 58802 (hereinafter called OWNER) and_____(hereinafter called CONTRACTOR).

ARTICLE 1 – WORK

1.01 CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

A. Contract No. 1 – General Construction

ARTICLE 2 – THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Williston Water Resource Recovery Facility (WRRF) Reuse Project
City of Williston
Williston, North Dakota

ARTICLE 3 – THE ENGINEER

3.01 The Project has been designed by Advanced Engineering and Environmental Services, LLC. who is hereinafter called ENGINEER and who is to act as OWNER'S representative, assume all duties and responsibilities, and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 Time of Essence

A. *All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are the essence of the Contract.*

4.02 Dates to Achieve Substantial Completion and Final Payment

A. The Work within each Base Bid and Alternate will be substantially completed within the following Substantial Completion dates when the Contract Times commence to run as provided in paragraph 4.01 of the General Conditions as may be amended by the Supplementary Conditions, and completed and ready for payment in accordance with paragraph 15.06 of the General Conditions as may be amended by the Supplementary Conditions within the following Final Completion dates:

1. **Contract No. 1 – General Construction**

    a. Intermediate Milestone No. 1: August 1, 2026

        All pipe, fittings, valves, Pressure Sustaining Valve Vault, and appurtenances (not including the electrical work associated with the Water Level Control System at the Pressure Sustaining Valve Vault) shall be completely installed, backfilled, tested, and operational **from Station 238+00 to Station 298+99**. See Drawing Sheets C323 through C329.

    b. Substantial Completion – May 1, 2027

        The Work shall be substantially complete on or before May 1, 2027 including all pipe installation, pump station installation, pump station start-up and testing, and all electrical work required for the pump station and for the Water Level Control System at the Pressure Sustaining Valve Vault. The pipeline and pump station shall be fully operational and capable of moving up to 500 gpm of treated reuse water from the WRRF to the Municipal Golf Course.

    c. Final Completion – June 1, 2027

Substantial Completion is defined as the time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of the 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 of delivering water to Owner's customers. In addition, to achieve Substantial Completion of the Work for distribution and transmission pipelines and all associated appurtenances required for a complete and operable installation located in agricultural fields, completed Work shall include top soil replacement, spreading, and cultivation of disturbed field areas to allow full and unhindered use by property owners as agricultural land for seed bed purposes in the spring of the immediately following spring planting season in each respective Base Bid and Alternate. The terms "substantially complete" and "substantially completed" as applied to all or a part of the Work refer to Substantial Completion thereof.

4.03 Liquidated Damages

A. CONTRACTOR and OWNER recognize that time is of essence of the Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 11 of the General Conditions as may be amended by the Supplementary Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not competed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay OWNER $2,500.00 for each day that expires after the time specified in paragraph 4.02 for Substantial Completion until the Work is substantially complete. Additionally,

CONTRACTOR shall pay OWNER $2,500.00 for each day that expires after the time specified in paragraph 4.02 for Interim Milestone Substantial Completion until the Work is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining of the Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER $1000.00 for each day that expires after the time specified in paragraph 4.02 for completion and readiness for final payment until the Work is completed and ready for final payment.

ARTICLE 5 – CONTRACT PRICE

5.01 OWNER shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds to the sum of the amounts determined pursuant to paragraph 5.01.A, below:

A. For all Work (including Base Bid and Owner selected Alternates *(to be identified)*),

(insert Bid Form and Alternates here)

ARTICLE 6 – PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. CONTRACTOR shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

6.02 Progress Payments; Retainage

A. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment on a monthly routine basis during performance of the Work as provided in the paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established in paragraph 2.05.A of the General Conditions as may be amended by the Supplementary Conditions:

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as ENGINEER may determine or OWNER may withhold, in accordance with paragraph 14.01 of the General Conditions as may be amended by the Supplementary Conditions:

a. 90 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by ENGINEER, and if the character and progress of the Work have been satisfactory to OWNER and ENGINEER, OWNER, on recommendation of ENGINEER, may determine that as long as the character and progress of the Work remain satisfactory to them, there will be no retainage on account of Work subsequently completed, in which case the remaining progress payments prior to Substantial Completion will be in an amount equal to 100 percent of the Work completed less the aggregate of payments previously made; and

b. 100 percent of cost of materials and equipment not incorporated in the Work (but delivered, suitably stored and accompanied by documentation satisfactory to OWNER with the balance being retainage).

1) Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 95 percent of the Work completed, less such amounts as ENGINEER shall determine in accordance with paragraph 15.01.C of the General Conditions as may be amended by the Supplementary Conditions and less 100 percent of ENGINEER's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.03 Final Payment

A. Upon final completion and acceptance of the Work in accordance with paragraph 15.06 of the General Conditions as may be amended by the Supplementary Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 15.06 as may be amended.

ARTICLE 7 – INTEREST

7.01 All moneys not paid when due as provided in Article 15 of the General Conditions as may be amended by the Supplementary Conditions shall bear interest at the maximum rate allowed by law at the place of the Project.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

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

C. CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance for the Work.

D. CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 5.03 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Conditions as provided in paragraph 5.06 of the General Conditions.

E. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of the construction to be employed by CONTRACTOR, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contact Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto

F. CONTRACTOR does not consider that any further examinations, investigations, explorations, test, 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 Contract Documents.

G. 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.

H. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

I. 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.

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

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 Contents

A. The Contract Documents consist of the following:
1. This Agreement (pages 1 to 8, inclusive);
2. Performance Bond;
3. Payment Bond;
4. General Conditions (pages 1 to 77 inclusive);
5. Supplementary Conditions (pages 1 to 28, inclusive);
6. Specifications as listed in the table of contents of the Project Manual;
7. Drawings consisting of one volume with cover sheets titled WILLISTON WATER RESOURCE RECOVER FACILITY (WRRF) REUSE PROJECT with each sheet bearing the following general title: WILLISTON WATER RESOURCE RECOVER FACILITY (WRRF) REUSE PROJECT;
8. Addenda (numbers _____ to _____, inclusive);
9. Notice of Award;
10. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

a. Notice to Proceed;
b. Written Amendments;
c. Work Change Directives;
d. Change Order(s).

B. The documents listed in paragraphs 9.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in paragraph 11.01 of the General Conditions as may be amended by the Supplementary Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 Terms

A. Terms used in this Agreement will have the meanings indicated in the General Conditions and Supplementary Conditions.

10.02 Assignment of Contract

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 Successors and Assigns

A. OWNER and CONTRACTOR each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 Severability

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 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 Contract. For the purposes of this Paragraph 10.05:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

IN WITNESS WHEREOF, OWNER AND CONTRACTOR have signed this Agreement in duplicate. One (1) counterpart each has been delivered to OWNER and CONTRACTOR. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or on their behalf.

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

OWNER:	CONTRACTOR:
_____	_____
By: _____	By: _____
Attest: _____	Attest: _____
Address for giving notices:	Address for giving notices:
_____	_____
_____	_____
_____	_____
Designated Representative:	Designated Representative:
Name: _____	Name: _____
Title: _____	Title: _____
Address: _____	Address: _____
_____	_____
Phone: _____	Phone: _____
Facsimile: _____	Facsimile: _____
E-mail: _____	E-mail: _____

END OF SECTION

SECTION 00 55 00 – NOTICE TO PROCEED

DATE: _____

TO: _____
(Contractor)

ADDRESS: _____

_____

PROJECT: **Williston Water Resource Recovery Facility (WRRF) Reuse Project**

CONTRACT FOR: _____

You are hereby notified to commence **WORK** in accordance with the Agreement dated _____. You are to have all **WORK** completed and ready for final payment per the agreement.

CITY OF WILLISTON
(Owner)

By: _____
(Authorized Signature)

_____
(Title)

ACCEPTANCE OF NOTICE:
Receipt of the above NOTICE TO PROCEED is hereby acknowledged by:

_____
(Contractor)

_____
(Authorized Signature)

_____
(Title)

Date: _____, 2026

Copy to ENGINEER
FRM (Use Certified Mail, Return Receipt Requested)

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SECTION 00 63 13.13

PERFORMANCE BOND FORM

SEE ATTACHED FORM

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PERFORMANCE BOND

Contractor	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Contract**
Name:	Description *(name and location)*:
Mailing address *(principal place of business)*:	Contract Price: Effective Date of 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.

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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:

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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

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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"]**

_____
_____
_____
_____
_____
_____

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SECTION 00 63 13.16

PAYMENT BOND FORM

SEE ATTACHED FORM

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PAYMENT BOND

Contractor	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Contract**
Name:	Description *(name and location)*:
Mailing address *(principal place of business)*:	Contract Price:
	Effective Date of 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.

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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.

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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;

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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"]**

_____
_____
_____
_____
_____
_____

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SECTION 00 62 76
APPLICATION FOR PAYMENT FORM

See Attached Form

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Contractor's Application For Payment No. _____

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

APPLICATION FOR PAYMENT

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

1.	**ORIGINAL CONTRACT PRICE**	$
2.	**Net change by Change Orders**	$
3.	**CURRENT CONTRACT PRICE (Line 1 ± 2)**	$
4.	**TOTAL COMPLETED AND STORED TO DATE (Column F on Progress Estimate)**	$
5.	**RETAINAGE:**	
	a. _____ % x $_____ Work Completed	$
	b. _____ % x $_____ Stored Material	$
	c. Total Retainage (Line 5a + Line 5b)	$
6.	**AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)**	$
7.	**LESS PREVIOUS PAYMENTS (Line 6 from prior Application)**	$
8.	**AMOUNT DUE THIS APPLICATION**	$
9.	**BALANCE TO FINISH, PLUS RETAINAGE (Column G on Progress Estimate + Line 5 above)**	$

CONTRACTOR'S CERTIFICATION

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

By:	Date:

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

is recommended by: _____ _____
(Engineer) (Date)

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

is approved by: _____ _____
(Owner) (Date)

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

Progress Estimate

Contractor's Application

For (contract):	Application Number:
Application Period:	Application Date:

A		B	Work Completed		E	F		G
Item			C	D		Total Completed and Stored to Date (C + D + E)	% (F) B	Balance to Finish (B - F)
Specification Section No.	Description	Scheduled Value	From Previous Application (C + D)	This Period	Materials Presently Stored (not in C or D)			
	Totals							

Progress Estimate

Contractor's Application

For (contract):	Application Number:
Application Period:	Application Date:

A				B	C	D	E	F		G
Item		Bid Quantity	Unit Price	Bid Value	Estimated Quantity Installed	Value	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (F) B	Balance to Finish (B - F)
Bid Item No.	Description									
	Totals									

Stored Material Summary

Contractor's Application

For (contract):							Application Number:		
Application Period:							Application Date:		
A	B	C	D		E		F		G
Invoice No.	Shop Drawing Transmittal No.	Materials Description	Stored Previously		Stored this Month		Incorporated in Work		Materials Remaining in Storage ($) (D + E - F)
			Date (Month/Year)	Amount ($)	Amount ($)	Subtotal	Date (Month/Year)	Amount ($)	
		Totals							

SECTION 00 63 13
REQUEST FOR INFORMATION FORM COVER

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RFI#

REQUEST FOR INFORMATION

Subject:

Location:

Owner:	Routing:
Project:	Other:
Drawing No:	Spec.

REQUEST

Name: Company: Date:

RESPONSE

Name: Company: Date:

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SECTION 00 63 49

WORK CHANGE DIRECTIVE FORM

SEE ATTACHED FORM

This page intentionally left blank

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

Owner:	Owner's Project No.:
Engineer:	Engineer's Project No.:
Contractor:	Contractor's Project No.:
Project:	
Contract Name:	
Date Issued:	Effective Date of Work Change Directive:

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

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

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:		
Title:		
Date:		

EJCDC® C-940, Work Change Directive.
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CHANGE ORDER NO.:

Owner: Owner's Project No.:
Engineer: Engineer's Project No.:
Contractor: Contractor's Project No.:
Project:
Contract Name:
Date Issued: Effective Date of Change Order:

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

Description:

[Description of the change]

Attachments:

[List documents related to the change]

Change in Contract Price	**Change in Contract Times [State Contract Times as either a specific date or a number of days]**
Original Contract Price: $ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. **[Number of previous Change Order]**: $ _____	**[Increase] [Decrease]** from previously approved Change Orders No.1 to No. **[Number of previous Change Order]**: Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: $ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] this Change Order: $ _____	**[Increase] [Decrease]** this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: $ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

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	Recommended by Engineer (if required)	Accepted by Contractor
By:		
Title:		
Date:		
	Authorized by Owner	Approved by Funding Agency (if applicable)
By:		
Title:		
Date:		

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CERTIFICATE OF SUBSTANTIAL COMPLETION

DATE OF ISSUANCE _____

OWNER City of Williston
CONTRACTOR _____
Contract: _____
Project: Williston Water Resource Recovery Facility (WRRF) Reuse Project

OWNER's Contract No. _____ ENGINEER's Project No. _____

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

To CITY OF WILLISTON _____
OWNER

And To _____
CONTRACTOR

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

_____
DATE OF SUBSTANTIAL COMPLETION

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by CONTRACTOR within _____ days of the above date of Substantial Completion.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees shall be as follows:

OWNER:_____

_____

_____

CONTRACTOR:_____

_____

_____

_____

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

[For items to be attached see definition of Substantial Completion as supplemented and other specifically noted conditions precedent to achieving Substantial Completion as required by Contract Documents.]

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 on _____
Date

_____
ENGINEER

By: _____
(Authorized Signature)

CONTRACTOR accepts this Certificate of Substantial Completion on _____
Date

_____
CONTRACTOR

By: _____
(Authorized Signature)

OWNER accepts this Certificate of Substantial Completion on _____
Date

City of Williston_____
OWNER

By: _____
(Authorized Signature)

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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 document prepared by Contractor, in a form acceptable to Engineer, to request 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; 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; contesting an initial decision by Engineer concerning the

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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.

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.

c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.

d. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

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

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

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

15. *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.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

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recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.

23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.

24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.

    a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.

    b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.

    c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.

25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.

28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.

30. *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.

31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.

32. *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.

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33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.

34. *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.

35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.

36. *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.

37. *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.

38. *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 or areas furnished by Owner which are designated for the use of Contractor.

39. *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.

40. *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.

41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

42. *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 of such Work.

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43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.

44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

45. *Supplier*—A manufacturer, fabricator, supplier, distributor, 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.

46. *Technical Data*

    a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.

    b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.

    c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.

47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.

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

49. *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.

50. *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.

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1.02 *Terminology*

A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*: The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day*: The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*: The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

1. does not conform to the Contract Documents;

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

3. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

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F. *Contract Price or Contract Times*: References to a change in "Contract Price or Contract Times" or "Contract Times or Contract Price" or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term "or both" is not expressed.

G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).

B. *Evidence of Contractor's Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.

C. *Evidence of Owner's Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

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into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.

B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

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ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

G. Nothing in the Contract Documents creates:

1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or

2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

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

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

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inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

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B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

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

4.03 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

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established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *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 Contract Price or 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. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

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. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. Abnormal weather conditions;

3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and

4. Acts of war or terrorism.

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D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:

1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.

2. Contractor shall not be entitled to an adjustment in Contract Price 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. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.

3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.

E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:

1. The circumstances that form the basis for the requested adjustment;

2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;

3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;

4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and

5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.

Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.

G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

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B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, 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 any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

B. *Removal of Debris During Performance of the Work*: During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.

C. *Cleaning*: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

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and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

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

5.03 *Subsurface and Physical Conditions*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;

2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and

3. Technical Data contained in such reports and drawings.

B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

C. *Reliance by Contractor on Technical Data*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

D. *Limitations of Other Data and Documents*: Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;

3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or

4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

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5.04 *Differing Subsurface or Physical Conditions*

A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;

2. is of such a nature as to require a change in the Drawings or Specifications;

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), 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. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; 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 advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. *Owner's Statement to Contractor Regarding Site Condition*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) 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.

D. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

E. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

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Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;

b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

c. Contractor failed to give the written notice required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:

1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

2. complying with applicable state and local utility damage prevention Laws and Regulations;

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3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;

4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.

C. *Engineer's Review*: Engineer will:

1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;

2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;

3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and

4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, 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.

E. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

F. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

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or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;

b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and

c. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;

2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

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of construction to be employed by Contractor, and safety precautions and programs incident thereto;

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

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conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.

B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.

C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

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Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.

E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.

F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.

H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.

D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

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Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.

F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

H. Contractor shall require:

1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and

2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.

I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.

K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

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L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.

M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.

N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

A. *Required Insurance*: Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.

B. *General Provisions*: The policies of insurance required by this Paragraph 6.03 as supplemented must:

1. include at least the specific coverages required;

2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;

3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;

4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and

5. include all necessary endorsements to support the stated requirements.

C. *Additional Insureds*: The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:

1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;

2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;

3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

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4. not seek contribution from insurance maintained by the additional insured; and

5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.

B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.

C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.

E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

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Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.

1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.

D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

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6.06 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

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B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.

C. 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 will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *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 must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment must 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.

7.05 *"Or Equals"*

A. *Contractor's Request; Governing Criteria*: Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that the proposed item:

1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

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2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

3) has a proven record of performance and availability of responsive service; and

4) is not objectionable to Owner.

b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.

B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

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3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:

    a. will certify that the proposed substitute item will:

        1) perform adequately the functions and achieve the results called for by the general design;

        2) be similar in substance to the item specified; and

        3) be suited to the same use as the item specified.

    b. will state:

        1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;

        2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

        3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

    c. will identify:

        1) all variations of the proposed substitute item from the item specified; and

        2) available engineering, sales, maintenance, repair, and replacement services.

    d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

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E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning 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. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.

B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.

E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.

F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

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H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.

J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.

K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.

L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.

M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

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7.09 *Permits*

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.11 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, 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 (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.

C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

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

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7.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.

B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.

C. 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.

D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.

F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

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I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as 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.

7.15 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent 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 by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Contractor shall:

a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determine and verify:

1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;

2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;

c. confirm that the Submittal is complete with respect to all related data included in the Submittal.

2. Each Shop Drawing or Sample must bear a stamp or specific written certification that 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.

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3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.

1. *Shop Drawings*

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.

2. *Samples*

a. Contractor shall submit the number of Samples required in the Specifications.

b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Engineer's Review of Shop Drawings and Samples*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

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

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

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document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. *Resubmittal Procedures for Shop Drawings and Samples*

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

2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. *Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs*

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:

   a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.

   b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.

   c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

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d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.

2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03. 2.04, and 2.05.

F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.

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 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 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 15.08:

1. Owner shall give Contractor written notice of any defective Work within 60 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.B, 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.

D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:

1. Observations by Engineer;

2. Recommendation by Engineer or payment by Owner of any progress or final payment;

3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. Use or occupancy of the Work or any part thereof by Owner;

5. Any review and approval of a Shop Drawing or Sample submittal;

6. The issuance of a notice of acceptability by Engineer;

7. The end of the correction period established in Paragraph 15.08;

8. Any inspection, test, or approval by others; or

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9. Any correction of defective Work by Owner.

E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *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 losses, damages, costs, and judgments (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 from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.

B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.

C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

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D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.

E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:

1. Checking for conformance with the requirements of this Paragraph 7.19;

2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and

3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.

F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.

G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.

D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

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

F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. An itemization of the specific matters to be covered by such authority and responsibility; and

3. The extent of such authority and responsibilities.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

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B. 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.

1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.

2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.

C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) 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 any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

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

9.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

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9.05 *Lands and Easements; Reports, Tests, and Drawings*

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

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

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

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ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.

B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

A. Engineer has the authority to reject Work in accordance with Article 14.

B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.

C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.

D. Engineer's authority as to changes in the Work is set forth in Article 11.

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E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

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

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, 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, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

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

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

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

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ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.

C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

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

1. Changes in 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 Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, 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

4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

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B. If Owner has issued a Work Change Directive and:

1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.

2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.

B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.

B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.

C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.

B. An adjustment in the Contract Price will be determined as follows:

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1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);

2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or

3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will be determined as follows:

1. A mutually acceptable fixed fee; or

2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;

b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;

c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;

d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and

f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

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11.08 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.

B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content*: Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal*: Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.

2. *Supporting Data*: The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.

    a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.

    b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

    The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review*: Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.

4. *Engineer's Full Review and Action on the Change Proposal*: Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

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Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

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

ARTICLE 12—CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and

4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

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and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: 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. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.

D. *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 will 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 will 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 will 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.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *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 will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *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 will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

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2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.

5. Other costs consisting of the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

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consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.

2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.

3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

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g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. The cost of purchasing, renting, or furnishing small tools and hand tools.

3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

6. Expenses incurred in preparing and advancing Claims.

7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:

a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.

b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:

1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.

2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.

2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

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Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 *Allowances*

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

B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.

C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

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thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:

a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.

2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

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D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

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

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: 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. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

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losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

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or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

2. 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 must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

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establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) 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.

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

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

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

   a. the Work has progressed to the point indicated;

   b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

   c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

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4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

    a. to supervise, direct, or control the Work;

    b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;

    c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;

    d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or

    e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

    a. the Work is defective, requiring correction or replacement;

    b. the Contract Price has been reduced by Change Orders;

    c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

    d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

    e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

    a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

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b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. The Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. The Contract Price has been reduced by Change Orders;

i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or

l. Other items entitle Owner to a set-off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract 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 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

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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 reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

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. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

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significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.

2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, 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.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.

2. The final Application for Payment must be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents;

   b. consent of the surety, if any, to final payment;

   c. 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.

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d. a list of all duly pending Change Proposals and Claims; and

e. 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.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Final Application and Recommendation of Payment*: If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Notice of Acceptability*: In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.

D. *Completion of Work*: 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 notice of the acceptability of the Work.

E. *Final Payment Becomes Due*: Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

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appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

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 as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), 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 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 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 60 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, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). 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.B, such that any related Claim must be brought within 30 days of the failure to pay.

D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

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.

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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 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by 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 directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and

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

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract 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.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

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attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

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

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; 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 for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *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) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

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provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and

2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient's place of business;

2. by registered or certified mail, postage prepaid, to the recipient's place of business; or

3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

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18.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. 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.

18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor 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.

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

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SECTION 00 73 00
SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement EJCDC C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added—for example, “Paragraph SC-4.05.”

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.02 *Terminology*

SC-1.02 Amend Paragraph 1.02.A at the end of the paragraph to add the following language:

Other terms used repeatedly in the Supplementary Conditions may be referenced in Paragraph 1.02.

SC-1.02 Amend Paragraph 1.02.C at the end of the paragraph to add the following language:

Note that Paragraph 1.02.C provides that the word “day” means a calendar day. An intended or inadvertent change to “working” day has ramifications throughout the documents and is not intended as a substitute for calendar days unless specifically agreed to, in writing, by the Owner.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

SC-2.01 Delete Paragraph 2.01.B in its entirety and insert the following in its place:

B. *Evidence of Contractor’s Insurance:* Before any Work at the Site is started, Contractor shall deliver to the Owner, with copies to each additional insured identified in the Supplementary Conditions, if any, certificates of insurance, certified copies of insurance policies, (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor is required to purchase and maintain in accordance with Article 6.

2.02 *Copies of Documents*

SC-2.02 Delete Paragraph 2.02.A in its entirety and insert the following paragraph in its place:

A. Owner shall furnish to Contractor up to three (3) printed copies of conformed Contract Documents (Project Manual and 11x17 Drawings) incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract and one copy in electronic portable document format (PDF). Additional printed copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction. Full sized (22-inch x 34-inch) sets of the Construction Drawings will be furnished at the cost of printing, which shall include labor and materials within the cost of reproduction.

2.03 *Before Starting Construction*

SC-2.03 Add the following information immediately after Paragraph 2.03.A.3:

4. revise the schedule as requested by the Owner’s Representative when:

   a. Work progress falls 10 percent behind scheduled progress.

   b. When time extensions are approved for changes and causes beyond Contractor’s control.

   c. When Contractor feels a significant reorganization of activities becomes necessary as a result of field and material supply conditions in order to meet the contract completion date of the Project.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

SC-2.04 Delete Paragraph 2.04.A in its entirety and insert the following new paragraph in its place:

A. Before any Work at the Site is started, a preconstruction conference will be held at a mutually agreed upon time and place to establish a working understanding among the parties as to the Work and to discuss the status of Contractor's insurance and bonds schedules referred to in Article 6, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, critical Work sequencing, field decisions and change orders, material deliveries, use of easements, Contractor's assignments for safety and first aid, daily report forms, and maintaining required records. The conference shall be attended by the Owner, Contractor's Project Manager, Contractor's Superintendent, Contractor's Subcontractors as the Contractor deems appropriate, Engineer, Engineer's Resident Project Representative, Governmental representatives, as appropriate, and others as requested by Contractor, Owner, and Engineer. The Engineer/Owner will preside at the preconstruction conference and will arrange for keeping and distributing the minutes to all persons in attendance. Contractor shall bring to the preconstruction conference submittals in accordance with specifications.

2.06 *Electronic Transmittals*

SC-2.06 Delete Paragraphs 2.06.B and 2.06.C in their entirety and insert the following in their place:

B. *Electronic Documents Protocol:* The parties shall conform to the following provisions in Paragraphs 2.06.B and 2.06.C, together referred to as the Electronic Documents Protocol ("EDP" or "Protocol") for exchange of electronic transmittals.

1. *Basic Requirements*

a. To the fullest extent practical, the parties agree to and will transmit and accept Electronic Documents in an electronic or digital format using the procedures described in this Protocol. Use of the Electronic Documents and any information contained therein is subject to the requirements of this Protocol and other provisions of the Contract.

b. The contents of the information in any Electronic Document will be the responsibility of the transmitting party.

c. Electronic Documents as exchanged by this Protocol may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and methods, subject to the same governing requirements, limitations, and restrictions, set forth in the Contract Documents.

d. Except as otherwise explicitly stated herein, the terms of this Protocol will be incorporated into any other agreement or subcontract between a party and any third party for any portion of the Work on the Project, or any Project-related services, where that third party is, either directly or indirectly, required to exchange Electronic Documents with a party or with Engineer. Nothing herein will modify the requirements of the Contract regarding communications between and among the parties and their subcontractors and consultants.

e. When transmitting Electronic Documents, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the receiving party's use of software application packages, operating systems, or computer hardware differing from those established in this Protocol.

f. Nothing herein negates any obligation 1) in the Contract to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations; 2) to comply with any applicable Law or Regulation governing the signing and sealing of design documents or the signing and electronic transmission of any other documents; or 3) to comply with the notice requirements of Paragraph 18.01 of the General Conditions.

2. *System Infrastructure for Electronic Document Exchange*

a. Each party will provide hardware, operating system(s) software, internet, e-mail, and large file transfer functions (“System Infrastructure”) at its own cost and sufficient for complying with the EDP requirements. With the exception of minimum standards set forth in this EDP, and any explicit system requirements specified by attachment to this EDP, it is the obligation of each party to determine, for itself, its own System Infrastructure.

1) The maximum size of an email attachment for exchange of Electronic Documents under this EDP is **10** MB. Attachments larger than that may be exchanged using large file transfer or physical media.

2) Each Party assumes full and complete responsibility for any and all of its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software, for use with respect to this EDP.

b. Each party is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology (“IT”) for maintaining operations of its System Infrastructure during the Project, including coordination with the party’s individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.

c. Each party will operate and maintain industry-standard, industry-accepted, ISO-standard, commercial-grade security software and systems that are intended to protect the other party from: software viruses and other malicious software like worms, trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. To the extent that a party maintains and operates such security software and systems, it shall not be liable to the other party for any breach of system security.

d. In the case of disputes, conflicts, or modifications to the EDP required to address issues affecting System Infrastructure, the parties shall cooperatively resolve the issues; but, failing resolution, the Owner is authorized to make and require reasonable and necessary changes to the EDP to effectuate its original intent. If the changes cause additional cost or time to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in price or time under the appropriate process in the Contract.

e. Each party is responsible for its own back-up and archive of documents sent and received during the term of the contract under this EDP, unless this EDP establishes a Project document archive, either as part of a mandatory Project website or other communications protocol, upon which the parties may rely for document archiving during the specified term of operation of such Project document archive. Further, each party remains solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract, or after termination of the Project document archive, if one is established, for as long as required by the Contract and as each party deems necessary for its own purposes.

f. If a receiving party receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission.

g. The parties will bring any non-conforming Electronic Documents into compliance with the EDP. The parties will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the communication.

h. The Engineer will operate a Project information management system (also referred to in this EDP as “Newforma”) for use of Owner, Engineer, and

Contractor during the Project for exchange and storage of Project-related communications and information. Except as otherwise provided in this EDP or the General Conditions, use of Newforma by the parties as described in this Paragraph will be mandatory for exchange of Project submittals, requests for information (RFIs), and other Project-related information.

SC-2.06 Supplement Paragraph 2.06 of the General Condtions by adding the following paragraph:

D. *Requests by Contractor for Electronic Documents in Other Formats*

1. Release of any Electronic Document versions of the Project documents in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be at the sole discretion of the Owner.

2. To extent determined by Owner, in its sole discretion, to be prudent and necessary, release of Electronic Documents versions of Project documents and other Project information requested by Contractor ("Request") in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be subject to the provisions of the Owner's response to the Request, and to the following conditions to which Contractor agrees:

a. The content included in the Electronic Documents created by Engineer and covered by the Request was prepared by Engineer as an internal working document for Engineer's purposes solely, and is being provided to Contractor on an "AS IS" basis without any warranties of any kind, including, but not limited to any implied warranties of fitness for any purpose. As such, Contractor is advised and acknowledges that the content may not be suitable for Contractor's application, or may require substantial modification and independent verification by Contractor. The content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other devices that may affect subsequent reuse.

b. Electronic Documents containing text, graphics, metadata, or other types of data that are provided by Engineer to Contractor under the request are only for convenience of Contractor. Any conclusion or information obtained or derived from such data will be at the Contractor's sole risk and the Contractor waives any claims against Engineer or Owner arising from use of data in Electronic Documents covered by the Request.

c. Contractor shall indemnify and hold harmless Owner and Engineer and their subconsultants from all claims, damages, losses, and expenses, including attorneys' fees and defense costs arising out of or resulting from Contractor's use, adaptation, or distribution of any Electronic Documents provided under the Request

d. Contractor agrees not to sell, copy, transfer, forward, give away or otherwise distribute this information (in source or modified file format) to any third party without the direct written authorization of Engineer, unless such distribution is specifically identified in the Request and is limited to Contractor's subcontractors. Contractor warrants that subsequent use by Contractor's subcontractors complies with all terms of the Contract Documents and Owner's response to Request.

3. In the event that Owner elects to provide or directs the Engineer to provide to Contractor any Contractor-requested Electronic Document versions of Project information that is not explicitly identified in the Contract Documents as being available to Contractor, the Owner shall be reimbursed by Contractor on an hourly basis for any engineering costs necessary to create or otherwise prepare the data in a manner deemed appropriate by Engineer.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

SC-3.01 Add the following new paragraph immediately after Paragraph 3.01.G:

H. The provisions of the Instructions to Bidders and Supplementary Conditions shall take precedence over the General Conditions. In the case of conflict, ambiguity, or discrepancy between Drawings and Specifications, or otherwise within the Contract Documents, the better quality or greater quantity of Work resulting in the greater cost shall be furnished and included in the Contract Price and the matter shall be brought to the Engineer's attention for resolution.

ARTICLE 4 - COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

SC-4.01 Delete Paragraph 4.01.A in its entirety and insert the following paragraph in its place:

A. The Contract Times will commence to run on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 60 days after the Effective Date of the Agreement.

4.03 *Reference Points*

SC-4.03 Add the following new paragraph immediately after 4.03.A:

B. Reference points shall be provided by the Engineer one (1) time. Subsequent reestablishment of reference points shall be the responsibility of the Contractor. Contractor shall notify the Engineer a minimum of two (2) weeks in advance of the need for construction reference points for the Project. All other layout and staking shall be the responsibility of the Contractor.

ARTICLE 5 - SITE, SUBSURFACE AND PHYSICAL CONDITIONS, HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

SC-5.01 Add the following new paragraphs immediately after 5.01.C:

D. Right-of-Ways: Where Work is in the highway or railroad right-of-way, access may be restricted, and space may be limited. The Contractor is subject to the provisions, as required by the State's Department of Transportation (DOT), County permit, or railroad right-of-way officer or permission document. The Owner will have the right to cease production, at no cost to the Owner, if the Contractor violates the DOT, County permit, or railroad provisions until such time that the Contractor is in compliance with required permit or access provisions.

E. The Contractor shall be responsible for all damage to crops and other property outside of the boundaries of the rights-of-way and easements and shall make satisfactory settlement for such damage directly with the property owner and tenant involved, as their interests in such damage may require.

5.02 *Use of Site and Other Areas*

SC-5.02 Add the following new paragraphs immediately after Paragraph 5.02.D:

E. Control of Work:

1. The Contractor shall execute the Work so that it will cause the least practicable interference with, and avoid prolonged interruption of or damage to, existing facilities, underground utilities, overhead utilities, and roadways. The Contractor shall obtain written approval from the Owner at least 72 hours before performing any Work that involves either connection to existing facilities or interruption of service or existing operations. The Contractor shall perform that Work when it causes the least interference with or annoyance, as determined by the Owner and Engineer.

2. The Contractor shall initiate, maintain, and supervise all weather protection and local and area climatic and seasonal precipitation event programs applicable to the Work. In the event of severe weather, the Contractor shall immediately inspect the Work at the Site and take all necessary actions to ensure that public access and safety are maintained.

3. The Contractor shall be responsible for: (a) performing the pumping, draining, and controlling of surface water and groundwater in a way that it will not endanger the Work or any adjacent facility or property, or interrupt, restrict, or interfere with the use of any adjacent facility or property, and (b) taking into account any dewatering operations from other Work.

4. Neither the Owner nor Engineer will accept or coordinate deliveries for the Contractor. The Contractor shall coordinate and be at the site to receive all deliveries. Materials and equipment stored on the site or right of way shall be placed so as to insure minimum danger and obstruction to the traveling public or property owners.

5. The Contractor shall take whatever steps, procedures, or means required to prevent dust nuisance due to the Contractor's operations on-site, along haul routes, within stockpile areas, and within or along equipment or material staging areas. Dust control measures shall be maintained at all times to the satisfaction of the Owner and Engineer and as required by any other Political Subdivision with jurisdiction.

6. Any dumping of spoil or waste material by the Contractor shall comply with all Federal, State, and local laws and regulations. Whether public or private landfills are used, the Contractor shall pay all required dumping fees and shall furnish to the Engineer evidence of such payments."

5.03 *Subsurface and Physical Conditions*

SC-5.03 Add the following new paragraphs immediately after 5.03.D:

E. In the preparation of Drawings and Specifications, Engineer relied upon the following information of explorations and tests of subsurface conditions at the Site, if any. It shall be the responsibility of the Contractor to determine to Contractor's own satisfaction the location and nature of surface and subsurface obstacles and the soil and water conditions, which will be encountered during the Work. Additional test borings and other exploratory options may be made by the Contractor at Contractor's own expense. Contractor shall make arrangements for soil investigation with Owner. Reports and existing drawings are intended for reference only. Contractor shall verify existing conditions prior to Bidding.

1. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data (if any), and specifically identifies the Technical Data in the report upon which Contractor may rely:

Report Title	**Date of Report**	**Technical Data**

2. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface and subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data (if any), and specifically identifies the Technical Data upon which Contractor may rely:

Drawings Title	**Date of Drawings**	**Technical Data**

F. Copies of reports and drawings itemized in SC 5.03.E, if any, that are not included with the Bidding Documents may be examined at Advanced Engineering and Environmental Services, LLC. (AE2S) in the Engineer of Record's home office location during regular business hours. These reports and drawings, if any, are not part of the Contract Documents, but the "technical data" contained therein upon which Contractor may rely as identified and established above are incorporated therein by reference. Contractor is not entitled to rely upon other information and

data utilized by Engineer and Engineer's Consultants in the preparation of Drawings and Specifications.

5.05 *Underground Facilities*

SC-5.05 Add the following new paragraphs immediately after Paragraph 5.05.A.5:

6. contacting all affected utilities prior to construction on this Contract and making their own investigations including exploratory excavation as needed to determine the location and type of crossing or paralleling a particular utility; associated costs shall be subsidiary to the pipeline unit prices, and shall be made in accordance with that specific State's Department of Health, State's Department of Environmental and Natural Resource, or similar department;

7. notification to all utilities and underground service agencies a minimum of 72 hours in advance of Work scheduled or envisioned and arrange to have their respective services located. The Contractor shall obtain acceptance, in writing, from the utility regarding the preservation of their respective service during construction. The acceptance letters/forms shall be submitted monthly (at a minimum) to the Owner's representative;

8. using extreme care when working around overhead utilities. If required, work permits from the respective utility shall be obtained by the Contractor. Should any facility, either underground or overhead, be unexpectedly encountered or damaged during construction, the Contractor shall immediately notify a representative of the company involved and take such steps as necessary for protection of the general public and his own personnel.

SC-5.05 Add the following new paragraph immediately after Paragraph 5.05.F:

G. The right is reserved to governmental agencies and to owners of utilities to enter at any time upon any street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work and for the purpose of maintaining and making repairs to their property.

5.06 *Hazardous Environmental Conditions at Site*

SC-5.06 Add the following new paragraphs immediately after Paragraph 5.06.A.3:

4. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which Contractor may rely:

Report Title	**Date of Report**	**Technical Data**

5. The following table lists the drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and Technical Data (if any) contained in such Drawings upon which Contractor may rely.

Drawings Title	**Date of Drawings**	**Technical Data**

ARTICLE 6 - BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

SC-6.01 Delete Paragraph 6.01.A in its entirety and insert the following paragraph in its place:

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect at 100 percent of the Contract Price for one (1) full year after the date when Substantial Completion is granted or to the end of the Warranty Period, whichever is greater, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

SC-6.01 Add the following paragraph immediately after Paragraph 6.01.B:

1. The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be one (1) year after Final Completion.

6.03 *Contractor's Insurance*

SC-6.03 Supplement Paragraph 6.03 with the following provisions after Paragraph 6.03.C:

D. *Other Additional Insureds*: Advanced Engineering and Environmental Services, LLC (AE2S), the City of Williston,and Williston Parks & Recreation, as additional insured. AE2S, the City of Williston, Williston Parks & Recreation, and subconsultants shall have all the benefits, rights, and coverage of an additional insured under these policies.

E. *Other Additional Insureds:* State of North Dakota Agencies, Officers, and Employees shall also have all the benefits, rights, and coverage of an additional insured under these policies. Policies shall contain a "Waiver of subrogation in favor of the state of North Dakota" waiving any right of recovery the insurance company may have against the State.

F. *Workers' Compensation and Employer's Liability:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, Jones Act, stop-gap employer's liability coverage for monopolistic states, and foreign voluntary workers' compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers' Compensation and Related Policies	**Policy limits of not less than:**
Workers' Compensation	
State	Statutory
Applicable Federal (e.g. Longshoreman's)	Statutory
Employer's Liability	
Each accident	$500,000
Each employee	$500,000

G. *Commercial General Liability - Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:

1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
2. damages insured by reasonably available personal injury liability coverage, and
3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

H. *Commercial General Liability - Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage.
   a. Such insurance must be maintained for three years after final payment.
   b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
4. Underground, explosion, and collapse coverage.

5. Personal injury coverage.

6. Additional insured endorsements that 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.

7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 “Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured” or its equivalent.

I. *Commercial General Liability - Excluded Content*: The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:

1. Any modification of the standard definition of “insured contract” (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).

2. Any exclusion for water intrusion or water damage.

3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.

4. Any exclusion of coverage relating to earth subsidence or movement.

5. Any exclusion for the insured’s vicarious liability, strict liability, or statutory liability (other than worker’s compensation).

6. Any limitation or exclusion based on the nature of Contractor’s work.

7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

J. *Commercial General Liability - Minimum Policy Limits*

Commercial General Liability	**Policy limits of not less than:**
General Aggregate	$2,000,000
Products - Completed Operations Aggregate	$1,000,000
Personal and Advertising Injury	$1,000,000
Bodily Injury and Property Damage - Each Occurrence	$1,000,000

K. *Automobile Liability:* Contractor shall purchase and maintain automobile liability insurance 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 must be written on an occurrence basis.

Automobile Liability	**Policy limits of not less than:**
Bodily Injury	
Each Person	$1,000,000
Each Accident	$1,000,000
Property Damage	
Each Accident	$1,000,000
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	$2,000,000

L. *Umbrella or Excess Liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies. Limits may be satisfied with excess/umbrella liability policy.

Excess or Umbrella Liability	**Policy limits of not less than:**
Each Occurrence	$2,000,000
General Aggregate	$2,000,000

M. *Contractor's Professional Liability Insurance*: If Contractor will provide or furnish professional services under this *Contract*, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

Contractor's Professional Liability	**Policy limits of not less than:**
Each Claim	$2,000,000
Annual Aggregate	$2,000,000

O. *Unmanned Aerial Vehicle Liability Insurance*: If Contractor uses unmanned aerial vehicles (UAV - commonly *referred* to as drones) at the Site or in support of any aspect of the Work, Contractor shall obtain UAV liability insurance in the amounts stated; name Owner, Engineer, and all individuals and entities identified in the Supplementary Conditions as additional insureds; and provide a certificate to Owner confirming Contractor's compliance with this requirement. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy.

Unmanned Aerial Vehicle Liability Insurance	**Policy limits of not less than:**
Each Claim	$2,000,000
General Aggregate	$2,000,000

P. The insurance required by the Contract Documents, through a policy or endorsement, shall include:

1) A provision that the policy and endorsements may not be cancelled or modified without thirty days' prior written notice to Owner;

2) A provision that any attorney who represents the State under this policy must first qualify as and be appointed by the State's Attorney General as a Special Assistant General as required under the State's Century Code;

3) A provision that Contractor's insurance coverage shall be primary (i.e. pay first) as respects to any insurance, self-insurance or self-retention maintained by the State and that any insurance, self-insurance or self-retention maintained by the State shall be in excess of the Contractor's insurance and shall not contribute with it;

4) Cross liability/severability of interest for all policies and endorsements.

Q. The legal defense provided to the State under the policy and any endorsements must be free of any conflicts of interest, even if retention of separate legal counsel for the State is necessary.

R. The Contractor shall furnish certificates of insurance and all endorsements to Owner prior to commencement of Work at the Site.

S. Failure to provide insurance as required by the Contract Documents is a material breach of contract entitling the State to Terminate for Cause.

T. The Certificate of Insurance MUST include provision for 30 days prior written notice prior to cancellation. "Will Endeavor to Mail" is not acceptable. Crossing out or X-ing over the words "endeavor to" will not be acceptable. Failure to comply with the required cancellation provision will cause the contracts to be rejected and will delay the Notice to Proceed."

6.04 *Builder's Risk and Other Property Insurance*

SC-6.04 Delete Paragraph 6.04.B and insert the following in its place:

B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof.

1. This insurance shall:
   a. Include the interests of Owner, Contractor, Subcontractors, Engineer, and any other individuals or entities identified herein, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;
   b. Be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, false work, and materials and equipment in transit and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;
   c. Include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
   d. Cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
   e. Allow for partial utilization of the Work by Owner;
   f. Include testing and startup; and
   g. Be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.
2. Contractor shall be responsible for any deductible or self-insured retention.
3. The policies or insurance required to be purchased and maintained by Contractor in accordance with this Paragraph SC-6.04.B shall comply with the requirements of

Paragraph 6.03 of the General Conditions and as revised by the Supplementary Conditions.

4. Additional Insureds:
    a. City of Williston,
    b. Williston Parks & Recreation
    c. Advanced Engineering and Environmental Services, LLC (AE2S)
    d. North Dakota Department of Environmental Quality
    e. State of North Dakota

SC-6.04 Delete Paragraph 6.04.D in its entirety.

ARTICLE 7 - CONTRACTOR'S RESPONSIBILITIES

7.03 *Labor; Working Hours*

SC-7.03 Add the following new subparagraphs immediately after Paragraph 7.03.C:

1. Regular working hours will be 7:00 AM to 7:00 PM local time.

2. Owner's legal holidays are federal holidays.

3. Contractor will not be permitted to work on a Saturday, Sunday, or legal holiday without Owner's written consent given after Contractor has provided written notice to Engineer a minimum of five (5) days in advance.

SC-7.03 Add the following paragraph immediately after Paragraph 7.03.C:

D. The Contractor shall be responsible for the conduct of Contractor’s employees and employees of Subcontractors and suppliers on the Work Site. The Contractor shall take immediate steps to remedy any activity that may be construed as discriminatory, or which creates a hostile work environment. Activities covered by this provision include, but shall not be limited to, physical contact or signs or language that is vulgar, profane, or racially or sexually derogatory.

7.05 *"Or Equals"*

SC-7.05 Add the following new subparagraph immediately after Paragraph 7.05.C:

1. “Or Equals" items of materials or equipment will be considered only during the bidding period as outlined in the Instructions to Bidders and Substitution Procedures.

7.06 *Substitutes*

SC-7.06 Add the following new subparagraph immediately after Paragraph 7.06.C:

1. Substitute items of materials or equipment will be considered only during the bidding period as outlined in the Instructions to Bidders and Substitution Procedures.

7.07 *Concerning Subcontractors and Suppliers*

SC-7.07 Amend Paragraph 7.07.D to include the following language after the last sentence:

If Owner or Engineer after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, in which case apparent Successful Bidder shall submit an acceptable substitute, Bidder’s Bid price will be increased (or decreased) by the difference in the cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.

7.12 *Record Documents*

SC-7.07 Add the following new paragraph immediately after Paragraph 7.07.M:

SC-7.12 Amend Paragraph 7.12.A to include the following language after the last sentence:

If the requirements of this Paragraph 7.12.A have not been satisfied, Engineer may negate all or part of a progress payment until compliance is reached.

7.13 *Safety and Protection*

SC-7.13 Add a new paragraph immediately after Paragraph 7.13.J:

K. Contractor agrees to promptly notify Owner of all potential Claims which arise from or result from this agreement. Contractor further agrees to take all reasonable steps to preserve all physical evidence and information which may be relevant to the circumstances surrounding a potential claim, while maintaining public safety, and to grant to the Owner the opportunity to review and inspect such evidence, including the scene of the accident.

ARTICLE 8 - OTHER WORK AT THE SITE

8.02 *Coordination*

SC-8.02 Add the following new Paragraph 8.02.C immediately after Paragraph 8.02.B:

C. Owner intends to contract with other contractors listed below for the performance of other work at or adjacent to the Site.

1. None specified at the writing of these Supplementary Conditions. If Owner contracts work at or adjacent to the Site, Contractor shall work with Owner to coordinate with other various contractors and work forces at the Site.

ARTICLE 9 - OWNER'S RESPONSIBILITIES

SC-9.13 Add the following new paragraph immediately after Paragraph 9.12:

9.13 *Owner's Site Representative*

A. Owner may furnish an “Owner’s Site Representative” to represent Owner at the Site and assist Owner in observing the progress and quality of the Work. The Owner’s Site Representative is not Engineer’s consultant, agent, or employee. Owner’s Site Representative will be identified by the Owner at the preconstruction meeting, if any. The authority and responsibilities of Owner’s Site Representative will be identified at the preconstruction meeting, if any.

B. The Owner may, from time to time, provide representatives during construction to also observe the Work and report to the Owner.

ARTICLE 10 - ENGINEER'S STATUS DURING CONSTRUCTION

10.02 *Visits to Site*

SC-10.02 Add the following new paragraphs immediately after Paragraph 10.02.B:

C. Progress Meetings

1. The Engineer shall schedule and hold regular on-Site progress meetings at least weekly and at other times (i.e. – more or less frequently) as requested by Contractor or as required by progress of the Work. The Contractor, Engineer, and all Subcontractors active on the Site shall attend each meeting. Contractor may at its discretion request attendance by representatives of its Suppliers, manufacturers, and other Subcontractors.

2. The Engineer will preside at the progress meeting and will arrange for keeping and distributing the minutes. The purpose of the meetings is to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop. During each meeting, the contractors shall present any issues which may impact progress with a view to resolve these issues expeditiously.

10.03 *Resident Project Representative*

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.B:

C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. The Owner will designate the Engineer to represent the Owner’s interest during the course of construction. The authority of the Engineer and RPR’s is further defined in Article 10 of the General Conditions. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:

1. *Conferences and Meetings*: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-

related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.

2. *Safety Compliance*: Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.

3. *Liaison*

a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.

b. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.

c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.

4. *Review of Work; Defective Work*

a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.

b. Observe whether any Work in place appears to be defective.

c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.

5. *Inspections and Tests*

a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.

b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.

6. *Payment Requests:* Review Applications for Payment with Contractor.

7. *Completion*

a. Participate in Engineer's visits regarding Substantial Completion.

b. Assist in the preparation of a punch list of items to be completed or corrected.

c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.

d. Observe whether items on the final punch list have been completed or corrected.

D. The RPR will not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).

2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.

3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.

5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.

7. Authorize Owner to occupy the Project in whole or in part.

E. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty or contract, tort or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, or to any surety for or employee or agent of any of them.

ARTICLE 11 - CHANGES TO THE CONTRACT

11.05 *Owner-Authorized Changes in the Work*

SC-11.05 Add new paragraphs immediately after Paragraph 11.05.C:

D. Except as specifically authorized in writing by the Engineer at the time additional Work is done beyond the original scope of the Contract Documents, the Contractor shall make no claims for additional compensation. The Contractor's plea of ignorance of foreseeable conditions which will create difficulties or hindrances in the execution of the Work will not be acceptable to the Owner as an excuse for any failure of the Contractor to fulfill the requirements of the Contract Documents, and shall not be a basis for the Contractor's claim for additional compensation. Any discrepancies in, or conflicts between, the items described in these Contract Documents must be submitted in writing to the Engineer for adjustment prior to proceeding with the Work, as any claims for additional compensation to achieve compliance with the requirements of those items will not be allowed or considered.

ARTICLE 12 - CLAIMS

12.01 *Claims*

SC-12.01 Add new paragraphs immediately after Paragraph 12.01.G:

H. *Claims Between Contractors*

1. Should Contractor cause damage to the Work or property of any separate contractor at the Site, or should any claim arising out of Contractor's performance of Work at the Site be made by any separate Contractor against another Contractor, the Owner, Engineer, or Engineer's Consultants, Contractor shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration, or at law.

2. Contractor shall, to the fullest extent permitted by Law, indemnify and hold harmless Owner, Engineer, Engineer's Consultant and the officers, directors, partners, employees, agents and other consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages (including, but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) arising directly, indirectly, or consequentially out of any action, legal or equitable, brought by any separate contractor against Owner, Engineer, or Engineer's Consultant to the extent that said claim is based on, or arises out of, Contractor's performance of the Work. Should a separate contractor cause damage to the Work or property of Contractor, or, should the performance of the Work by any separate contractor at the Site give rise to any other Claim, Contractor shall not institute any action, legal or equitable, against Owner, Engineer, or Engineer's Consultant or permit any action against any of them to be maintained and continued in its name or for its benefit in any court, or before any arbiter, which seeks to impose liability on, or to recover damages from, Owner, Engineer, or Engineer's Consultant on account of any such damage or Claim.

3. If Contractor is delayed at any time in performing or furnishing Work by any act or neglect of a separate contractor, and Owner and Contractor are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, Contractor may make a Claim for an extension of times in accordance with Article 12. An extension of the Contract Times shall be Contractor's exclusive remedy with respect to Owner, Engineer,

and Engineer's Consultant(s) for any delay, disruption, interference or hindrance caused by any separate contractor.

ARTICLE 13 - COST OF WORK: ALLOWANCES, UNIT PRICE WORK

13.01 *Cost of the Work*

SC-13.01 Supplement Paragraph 13.01.B.5.c.(2) by adding the following sentence:

The equipment rental rate book that governs the included costs for the rental of machinery and equipment owned by Contractor (or a related entity) under the Cost of the Work provisions of this Contract is the most current edition of Rental Rate Blue Book for Construction Equipment or the AED Green Book: Rental Rates & Specifications for Construction Equipment or as identified during a preconstruction conference and agreed to by Owner, Engineer, and Contractor.

SC-13.01 Supplement Paragraph 13.01.C.2 by adding the following definition of small tools and hand tools:

For purposes of this paragraph, "small tools and hand tools" means any tool or equipment whose current price if it were purchased new at retail would be less than $500.

13.03 *Unit Price Work*

SC-13.03 Delete Paragraph 13.03.E in its entirety and insert the following in its place:

E. *Adjustments in Unit Price*

1. There will be no adjustments in the Unit Prices for Unit Price Work for increased or decreased quantities under this Contract. Quantities for items listed on the Contractor's Bid Form will be measured during construction by Engineer's Field Representative, and the final measured quantities multiplied by the Unit Price shall be used to determine the Contract Price. To complete the Project in accordance with the intent of the Contract Documents it is anticipated that quantities of several items will be more or less than estimated on the Contractor's Bid Form. Accordingly, there will be no compensation for material restocking, if necessary.

ARTICLE 14 - TESTS AND INSPECTIONS: CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.02 *Tests, Inspections, and Approvals*

SC-14.02 Delete Paragraph 14.02.B in its entirety and insert the following in its place:

B. Contractor shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents, unless specifically identified as a service to be retained and paid for by the Owner.

ARTICLE 15 - PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

15.01 *Progress Payments*

SC-15.05 Add the following new Paragraphs immediately following Paragraph 15.01.C.6.e:

f. Failure to make payment to Subcontractors, Supplier, or labor.

g. Claims made by Engineer for additional compensation because of Contractor delays or rejection of *defective* Work.

h. Liability for liquidated damages has been incurred by Contractor.

SC-15.01 Delete Paragraph 15.01.D and replace with the following:

D. *Payment Becomes Due*

1. 45 days after presentation of the Application for Payment to the Owner's Board of Directors with Engineer's recommendation, and if approved by the Owner's Board of Directors, the amount recommended will (subject to the provisions of Paragraph 15.01.C and 15.01.E) become due, and when due will be paid by Owner to Contractor.

15.03 *Substantial Completion*

SC-15.03 Add the following new subparagraph to Paragraph 15.03.B:

1. 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, will 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 15.

15.04 *Partial Use or Occupancy*

SC-15.04 Add the following new subparagraph to Paragraph 15.04.A:

5. Owner may at any time request in writing Contractor to permit Owner to take over operation of any part of the Work although it may not be substantially complete. A copy of such request will be sent to Engineer, and within a reasonable time thereafter Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected prior to final payment. If Contractor does not object in writing to Owner and Engineer that such part of Work is not ready for separate operation by Owner, Engineer will finalize the list of items to be completed or corrected and will deliver such list to Owner and Contractor together with a written recommendation as to the division of responsibility pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, utilities, insurance, warranties, and guarantees for that part of the Work which will become binding upon Owner and Contractor at the time the Owner takes over such operation (unless they shall have otherwise agreed in writing and so informed Engineer). During such operation and prior to Substantial Completion of such part of Work, Owner shall allow Contractor reasonable access to complete or correct items on said list and to complete other related Work.

15.05 *Final Inspection*

SC-15.05 Add the following new Paragraph 15.05.B:

B. Upon correction of deficiencies and completion of the entire Work within each Project Zone, Contractor shall notify Engineer in writing requesting a final inspection. If, in the Opinion of the Engineer, the Contractor has satisfactorily completed the Work within each respective Project Zone, Contractor, Engineer, and Owner shall execute the Final Inspection and Acceptance form.

15.08 *Correction Period*

SC-15.08 Add the following new Paragraphs 15.08.G and 15.08.H:

G. The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be the number of years set forth in SC 6.01.B.1; or if no such revision has been made in SC 6.01.B, then the correction period is hereby specified to be one year after final completion.

H. It is understood that during the warranty period, repairs due to faulty workmanship or materials shall be covered by the Performance Bond. However, a break in one of the pipelines shall be deemed an emergency and must be repaired immediately. The Contractor, therefore, prior to leaving the Project, shall have an understanding and agreement by signed letter or appropriate entry in the Owner's minutes of the meeting as to procedure for making said emergency repairs and notifications to the Contractor.

ARTICLE 16 - SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

SC-16.01 Add the following new paragraph immediately after Paragraph 16.01.A:

B. Historical/Archaeological Finds: If during the course of construction evidence of deposits of historical or archaeological interest is found, the Contractor shall cease operations affecting the find and shall notify the Owner, and the State Historical Society or similar agency of reporting within that particular state. No further disturbance of the deposits shall ensue until the Contractor has been notified in writing by the Engineer that he may proceed.

ARTICLE 18 - MISCELLANEOUS

No suggested Supplementary Conditions in this Article.

EXHIBIT A - SOFTWARE REQUIREMENTS FOR ELECTRONIC DOCUMENT EXCHANGE

Item	Electronic Documents	Transmittal Means	Data Format	Note (1)
a.1	General communications, transmittal covers, meeting notices and responses to general information requests for which there is no specific prescribed form.	Email	Email	
a.2	Meeting agendas, meeting minutes, RFI's and responses to RFI's, and Contract forms.	Email w/ Attachment	PDF	(2)
a.3	Contactors Submittals (Shop Drawings, "or equal" requests, substitution requests, documentation accompanying Sample submittals and other submittals) to Owner and Engineer, and Owner's and Engineer's responses to Contractor's Submittals, Shop Drawings, correspondence, and Applications for Payment.	Email w/ Attachment or Newforma	PDF	
a.4	Correspondence; milestone and final version Submittals of reports, layouts, Drawings, maps, calculations and spreadsheets, Specifications, Drawings and other Submittals from Contractor to Owner or Engineer and for responses from Engineer and Owner to Contractor regarding Submittals.	Email w/ Attachment or LFE or Newforma	PDF	
a.5	Layouts and drawings to be submitted to Owner for future use and modification.	Email w/ Attachment or LFE or Newforma	DWG	
a.6	Correspondence, reports and Specifications to be submitted to Owner for future word processing use and modification.	Email w/ Attachment or LFE or Newforma	DOC	
a.7	Spreadsheets and data to be submitted to Owner for future data processing use and modification.	Email w/ Attachment or LFE	EXC	
a.8	Database files and data to be submitted to Owner for future	Email w/ Attachment or LFE	DB	

	data processing use and modification.			
Notes				
(1)	All exchanges and uses of transmitted data are subject to the appropriate provisions of Contract Documents.			
(2)	Transmittal of written notices is governed by Paragraph 18.01 of the General Conditions.			
Key				
Email	Standard Email formats (.htm, .rtf, or .txt). Do not use stationery formatting or other features that impair legibility of content on screen or in printed copies.			
LFE	Agreed upon Large File Exchange method (FTP, CD, DVD, hard drive).			
PDF	Portable Document Format readable by Adobe® Acrobat Reader.			
DWG	Autodesk® AutoCAD .dwg format.			
DOC	Microsoft® Word .docx format.			
EXC	Microsoft® Excel .xls or .xml format.			
DB	Microsoft® Access .mdb format.			

END OF SECTION

DIVISION 01
GENERAL REQUIREMENTS

SECTION 01 10 00
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. This section includes:

1. Project Description
2. Contract Information.
3. Administrative and Procedural Sections.
4. Description of Work for All Construction.
5. Work by Owner.
6. Work Under Other Contracts.
7. Work Sequence.
8. Access to Streets and Highways.
9. Reference Standards.
10. NPDES Construction Storm Water Permit.
11. Fines.
12. Coordination of Existing Conditions and Contract Documents.
13. Salvaged Demolition Debris.
14. Restocking.
15. Traffic Control

1.02 PROJECT DESCRIPTION

A. Contract No. 1 - General Construction: Work generally consists of a reuse water pipeline consisting of furnishing and installing the following approximate quantities: 30,000 feet of 8-inch, DIPS, DR11 HDPE installed by open-cut and directional drilling methods; various fittings; various gate valves; air release/vacuum valve assemblies; drain connections; surface restoration; installation of an Owner supplied buried pump station; a water level/pump control system; and all associated fittings and appurtenances, restoration, flushing and testing, signage, seeding, and gravel.

1.03 CONTRACT INFORMATION.

A. The Owner will award a single Prime Contract for the Project as follows:

1. A single contract (Contract No. 1) for all work under Contract No. 1 - General Construction unit price contract

B. The Contractor shall not commence work until proper execution of the contract and written authorization to proceed has been issued by the Owner. Proper

execution of the contract shall include all surety bonds and insurance requirements.

C. The division of work as made by the specifications and contract drawings is for the purpose of specifying work which is required. There is no attempt to make classification according to trades or any agreements, which may exist between contractors or subcontractors and trade unions. Classification of the work shall be the Contractor's responsibility.

D. The location of work under these contract documents is located on property of the Owner or easements obtained by the Owner, as shown on the contract drawings.

E. Completion Dates:

1. Refer to the Project Completion Dates stated in Section 00 52 00 - Agreement.

F. Winter construction may be required. Contractor shall include in their Bid all necessary requirements for sequencing and winter construction to meet the completion dates.

G. Contractor shall replace, compact, and level top soil as part of Substantial Completion requirements. The pipeline installation's backfilling, compaction, and grading shall be completed within one mile of ongoing project pipeline installation. Prior to mobilizing to a new location backfilling, compaction, and grading shall be completed. Landscape final landscaping and seeding shall be part of Final Completion.

H. Liquidation Damages for this project are as indicated in the Standard Contract between Owner and Contractor.

I. Work of each Contract is identified in the following Articles. The lists may not necessarily be all inclusive and Contractor shall confirm that all necessary specification sections and drawings required to complete the work under each contract shall be included within each Contract.

1.04 CONTRACTUAL, ADMINISTRATIVE AND PROCEDURAL SECTIONS APPLICABLE TO ALL CONTRACTS

A. Division 00 - Contract Requirements: All Sections.

B. Division 01 - General Requirements: All Sections.

1.05 DESCRIPTION OF WORK FOR CONTRACT NO. 1 – GENERAL CONSTRUCTION

A. General: The following is provided to assist the Bidder in locating the major components and Work associated with the various Contract bid items. It is not

intended to provide an all-inclusive list of every drawing or specification that describes work associated with each Contract. In addition to the work shown or specified in the Specifications and Drawings listed below, Bidder shall include all work related to each Contract in the bidder's price for each bid.

1. All Specification Divisions and Drawings.

1.06 WORK BY OWNER

A. Contractor shall coordinate the timing and operational requirements of the Work with the Owner and Engineer.

B. Decommissioning of process units, tanks, equipment or systems as required by the Contractor for the purposes of completing the Work. Decommissioning is limited to taking the unit, tank, item of equipment or system out of service. The Contractor is responsible for disconnecting piping, power, utilities, and controls; for demolition; for temporary valves, barriers, piping, barricades, and other temporary facilities; and all other Work.

C. Operation of existing facilities not taken out of service or otherwise made available to the Contractor for purposes of executing the Work.

1.07 WORK UNDER OTHER CONTRACTS

A. The Pump Station is Owner procured, and will be installed by the General Contractor under this Contract.

B. The Pump Station electrical service responsibilities (Section 26 05 08) are as follows:

1. Utility extension from the existing utility pedestal.
    a. Primary circuitry cable and associated trenching will be provided by the serving electric utility (Montana-Dakota Utilities Co.).
    b. Conduit in accordance with service utility standards will be provided by the Electrical Contractor.
2. New transformer pad
    a. Site preparation, transformer pad, and metering equipment will be installed by Electrical Contractor in accordance with Montana-Dakota Utilities Co. standard concrete pad detail.
    b. Transformer will be provided, installed, and terminated by the serving electric utility (Montana-Dakota Utilities Co.) to the utility disconnect provided by Electrical Contractor.
    c. Meter socket will be provided and connected to the utility disconnect provided by Electrical Contractor.
    d. Meter will be provided by the serving electric utility (Montana-Dakota Utilities Co.).
3. All work downstream of the utility disconnect shall be by Electrical Contractor.

C. The Meter Vault electrical service responsibilities (Section 26 05 08) are as follows:

1. Utility extension from the existing utility pedestal.
    a. Primary circuitry cable and associated trenching will be provided by the serving electric utility (Montana-Dakota Utilities Co.).
    b. Conduit in accordance with service utility standards will be provided by the Electrical Contractor.
2. New transformer pad
    a. Site preparation, transformer pad, and metering equipment will be installed by Electrical Contractor in accordance with Montana-Dakota Utilities Co. standard concrete pad detail.
    b. Transformer will be provided, installed, and terminated by the serving electric utility (Montana-Dakota Utilities Co.) to the utility disconnect provided by Electrical Contractor.
    c. Meter socket will be provided and connected to the utility disconnect provided by Electrical Contractor.
    d. Meter will be provided by the serving electric utility (Montana-Dakota Utilities Co.).
3. All work downstream of the utility disconnect shall be by Electrical Contractor.

1.08 GENERAL COORDINATION

A. Coordinate Work of the various Sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed at a later date.

B. Verify characteristics of elements of interrelated materials are compatible; coordinate Work of various Sections having interdependent responsibilities for installing, connection to, and placing in service, such materials.

1.09 COORDINATION OF EXISTING CONDITIONS AND CONTRACT DOCUMENTS

A. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn by Contractor from subsurface data. Additional subsurface data gathering operations may be made by Contractor. Contact Owner for site access for additional test borings and/or other exploratory operations which may be made by Contractor at no cost to Owner.

B. Locate existing underground utilities in areas of work. Provide adequate means of support and protection during operations for utilities that are to remain in place.

C. The locations of the utilities shown on the Drawings cannot be guaranteed. Contractor shall determine exact location of utilities. Should uncharted or incorrectly charted piping or other utilities be encountered, consult utility owner immediately for directions. Cooperate with Owner and utility companies in

keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

D. Do not interrupt existing utilities except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided.

E. Take and verify dimensions of existing structures, piping, and equipment required for the proper fabrication and installation of new piping and equipment.

F. The Drawings indicate required pipe sizes and the general arrangement for major piping and equipment. Layout and arrangement for certain other piping systems shall be in conformance to the equipment items furnished. Locations shall be verified in the field by the Contractor. Valves and fittings furnished shall be of such dimensions to allow for the installation of this piping as shown on the Drawings.

G. The final length and location of required pipe connections shall be coordinated to meet the requirements and recommendations of the equipment manufacturer and shall be subject to the approval of the Owner and Engineer.

H. Install no work that directly connects to equipment until such time as complete shop drawings of said equipment have been reviewed and approved by the Engineer.

I. Discrepancies discovered before or after work has started shall be brought to the attention of the Engineer immediately, and the Engineer reserves the right to require minor changes in the work of Contractor to eliminate such discrepancies.

1.10 WORK SEQUENCE

A. Sequencing of the Work shall be the responsibility of the Contractor with input from all subcontractors. Refer to Section 01 12 16 – Work Sequence Requirements for additional information and Project requirements.

B. Coordinate construction schedule, Work Sequence, and operations with the occupancy requirements of other affected parties. Refer to Section 01 31 13 and Section 01 31 19 for Construction Coordination responsibilities and Construction Meeting responsibilities.

1.11 ACCESS TO STREET HIGHWAYS

A. Maintain suitable means of access for property owners abutting streets and highways involved in construction, except as specifically permitted otherwise by Owner.

B. The Contractor shall be responsible for all construction signing, flagging, and protection of the public. Signing shall conform to requirements as set forth in the Manual on Uniform Traffic Control devices.

C. Whenever construction is stopped due to inclement weather, weekends, holidays, or other reasons, suitable access shall be provided for all property owners.

1.12 WORK ON STREET RIGHT-OF-WAY

A. All Work performed within the street or road right-of-way or utility easements shall be performed in accordance with the North Dakota Department of Transportation, North Dakota Standards for safety, protection of the public, signage, flagging, and surface restoration. Contractor shall be responsible for maintaining traffic at all times.

B. Contractor's traffic control including signage, flagging, barricades, and other means for protection of the public shall be in accordance with the approved traffic control plan, and the Manual of Uniform Traffic Control Devices, latest versions.

C. All other costs associated with special requirements for Work on street right-of-way or utility easements shall be incidental to contract price for that item of Work being performed.

1.13 WORK ON RAILROAD RIGHT-OF-WAY

A. All Work performed within the railroad right-of-way shall be performed according to the applicable railway requirements for safety, signage, flagging, and surface restoration.

B. Prior to commencing any work on the BNSF railroad right of ways, Contractor is to complete the safety training program at Internet Website http://www.bnsfcontractor.com. This training must be completed no more than one year in advance of Licensee's entry on the Premises.

C. **The Contractor shall be responsible for completing, submitting, coordinating, and paying for the BNSF railroad "Request for Inspector Coordinator and Flagging Field Services" required for all Work within the BNSF railroad right-of-way.**

1.14 TEMPORARY CONSTRUCTION

A. All temporary piping, pumps, and associated products for the Project shall be the responsibility of the General Contractor to construct, operate, and maintain. The General Contractor shall pay electricity costs associated with temporary pumping, tools, etc. as well as all other related costs for temporary construction required to complete the Work as included in Section 01 50 00.

1.15 STARTUP

A. Startup will require the Contractor to clean, disinfect, fill, pressurize, test, flush, pig, etc. new pipeline installations or modified pipe prior to placing online.

B. Contractor shall be fully responsible for all preparation leading up to startup including disposal of all flush and pigging water and cleaning solutions.

C. Contractor must properly dispose of chlorinated water or other disinfecting solution. Chlorinated water must be dechlorinated. Dechlorinated water will not be disposed of on the ground without approval. Sanitary Sewer is not available for disposal of water.

D. Refer to Section 01 12 16 – Work Sequence Requirements for additional information and Project requirements.

E. Contractor shall coordinate all startup activities to comply with all permits, licenses, contracts, and Owner requirements.

1.16 REFERENCE STANDARDS

A. For products specified by association or trade standards, comply with requirements of the standard, except when requirements that are more rigid are specified or are required by applicable codes.

B. The date of the standard is that in effect as of the bid date, or date of Owner-Contractor Agreement when there are no bids, except when a specific date is specified.

C. Obtain copies of standards when required by contract documents. Maintain copy at job site during progress of the specific Work.

1.17 NPDES CONSTRUCTION STORM WATER PERMIT

A. The Project consists of disturbing more than one (1) acre of area and will require a NPDES/SDS Construction Storm Water Permit.

B. Contractor shall be responsible for all provisions required in the NPDES Construction Storm Water Permit for the Project including the storm water pollution prevention plan (SWPPP) that is required to be submitted with the permit and all comments received by the North Dakota Department of Environmental Quality (NDDEQ) regarding the permit and SWPPP for approval.

C. See Section 01 50 00 for additional requirements.

1.18 FINES

A. In the event the Owner is fined by the Environmental Protection Agency or North Dakota Department of Environmental Quality (NDDEQ) as a result of the Contractor's actions or lack of actions, the Owner will deduct from payment, due to the Contractor, corresponding amounts to cover the cost of such fines, including the costs of related engineering and legal fees.

1.19 SALVAGED DEMOLITION DEBRIS

A. Owner shall have the right to retain select demolition materials or debris. At the discretion of Owner, select demolition materials or debris items shall be stored on-site and remain the property of the Owner. Owner shall designate the location for storage of salvageable demolition material or debris items. Contractor shall place selected items in designated storage area.

1.20 RESTOCKING

A. There will be no additional compensation due to restocking charges for materials not used on the project.

1.21 TRAFFIC CONTROL

A. Contractor is required to develop a traffic control plan to submit as a shop drawing for review by the Engineer a minimum of two (2) weeks prior to the start of construction.

PART 2 PRODUCTS

2.01 NOT USED.

PART 3 EXECUTION

3.01 NOT USED.

END OF SECTION

SECTION 01 12 16
WORK SEQUENCE

PART 1 GENERAL

1.01 SUMMARY

A. Section includes requirements for sequencing, scheduling, and completing the Work associated with distribution and transmission pipelines within the Base Bid including:

1. Observation, Operation, and Maintenance Access.
2. General Constraints on Sequence, Scheduling, and Completion of Work.
3. Interruption of Operations.
4. Shutdown Constraints.
5. Utilities.
6. Work by Others.

1.02 OBSERVATION, OPERATION, AND MAINTENANCE ACCESS

A. Provide safe, continuous access to Work site(s) and along pipeline installation areas for Owner and Engineer representatives at all times.

1.03 GENERAL CONSTRAINTS ON SEQUENCE, SCHEDULING, AND COMPLETION OF WORK

A. Work Sequence:

1. Construction shall not commence until June of 2026.
2. For pipeline installation in cultivated areas, Contractor shall replace, compact, and level top soil as part of Substantial Completion requirements. The pipeline installation's backfilling, compaction, and grading shall be completed within one mile of ongoing project pipeline installation. Prior to mobilizing to a new location backfilling, compaction, and grading shall be completed.
3. For pipeline installation in grass areas occurring in right-of-way, ditch, or other areas Contractor shall replace and compact top soil. The pipeline installation's backfilling, compaction, and rough grading shall be completed within one mile of ongoing project pipeline installation. Prior to mobilizing to a new location backfilling, compaction, and grading shall be completed. Final landscaping and seeding shall be considered part of Final Completion.
4. Installation of bores prior to the construction season in which the work will be completed will not be acceptable as an approach to pipeline installation.

B. Work Sequence and Constraints:

1. Utilize description of critical events in this Section as a guideline for scheduling and undertaking the Work.
2. Construct Work in logical phases as required to accommodate Owner's occupancy and operations.
3. Contractor shall schedule and conduct construction to insure Owner's continual use of the system with minimal interruption.
4. During the construction period, coordinate construction schedule and operations with the Owner and Engineer.
5. To meet anticipated water demand and water quality objectives, it is imperative that the contractor is successful at completing portions of the project according to the project completion dates.
6. Work sequence and constraints presented do not include all items affecting completion of the Work but are intended to describe critical events necessary to minimize disruption of the existing system and meet Owner's service goals.
7. Refer to Section 01 31 13 and 01 33 00.

1.04 INTERRUPTION OF OPERATIONS

A. Execute the Work while the existing system is in operation as specified in this Section and other Sections and indicated on the Drawings.

B. Indicate required shutdown of existing system pipeline segments or interruption of existing operations on Progress Schedule. Reference existing pipeline segments by Drawing number.

C. Evaluate the request based on the Owner's ability to reliably meet capacity demands.

D. Do not begin interruption or alterations of existing pipeline segments until Engineer's written permission has been received.

E. Minimize shutdown times by thorough advanced planning. Have required equipment, materials, and labor on hand at time of shutdown and through completion of the Work.

F. Where required to minimize operational interruptions while complying with specified sequencing constraints, provide temporary pumping, power, lighting, and safety devices as necessary.

1.05 UTILITIES

A. Contractor shall provide advanced notice and utilize services of ND One Call for location and marking of underground utilities operated by utility agencies other than the Owner.

B. Maintain electrical, telephone, water, gas, sanitary facilities, and other utility services to existing City of Williston system customers should Work effect existing utilities. Provide temporary utilities when necessary. All costs for temporary utilities shall be at Contractor's expense and shall be incidental to the Work.

1.06 WORK BY OTHERS

A. Where proper execution of the Work depends upon Work by others, inspect and promptly report discrepancies and defects.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

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SECTION 01 14 00
WORK RESTRICTIONS

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes:

1. Special Provisions.
2. Contractor Use of Site and Premises.
3. Owner Occupancy Requirements.
4. Road Restrictions.
5. Other Construction Requirements.

1.02 SPECIAL PROVISIONS

A. Construction shall not commence until the construction agreement between the Owner and Contractor has been fully executed.

B. In addition to the liquidated damages as stated in Section 00 52 00 – Agreement, Contractor will also be responsible for payment of any legitimate claims made by other parties (i.e., other contractors, residents, etc.) within the area who have incurred a loss as a result of Contractor's construction practices or failure to complete the Work of this project by the specified completion date(s).

C. Contractor will not be entitled to any compensation for causes resulting in delays or hindrances to the Work. Extensions of time will be granted for unavoidable delays, which in the opinion of the Engineer are clearly beyond the control of the Contractor. Unavoidable delays include, but are not limited to, acts of God or the public enemy, acts of the Owner, fires, floods, epidemics, quarantine restrictions, strikes, and freight embargoes. The Engineer must receive written request for time extension from the Contractor not more than 10 days after commencement of delay before any time extension will be considered. Requests made beyond the 10-day limit will be cause for denial. Any extension of time will not relieve the Contractor or Contractor’s sureties from their obligations, which shall remain in full force and effect until the satisfactory discharge of the Contract.

D. It shall be the Contractor's responsibility to follow OSHA standards for all Work.

E. All incidental damages to streets, driveways, berms, etc., due to Contractor's construction techniques shall be repaired at the Contractor's expense prior to making final payment.

F. Traffic signs affected by construction activity shall be removed, stored, and replaced by Contractor. Temporary replacement signs shall be erected as required. Damage or lost signs as a result of the Project shall be replaced by the

Contractor and the replacement cost shall be considered incidental to the Contract.

G. Contractor shall obtain such permits and licenses that are required for completion of the Work. Permits include, but are not limited to;

1. National Pollutant Discharge Elimination System (NPDES) Storm Water Permit.

1.03 CONTRACTOR USE OF SITE AND PREMISES

A. Limit use of Site and premises to allow:

B. Owner occupancy.

1. Work by Others.

C. Contractor shall perform all work between the hours of 7 am to 7 pm, Monday through Friday unless written authorization has been approved from the Owner or Engineer.

D. Coordinate performance of all Work with Owner operations.

E. Coordinate use of premises under direction of Engineer. Contractor shall confine construction equipment, storage of materials and equipment and operations of workmen to areas permitted by law, ordinances, permits, or requirements of Contract Documents, and shall not unreasonably encumber premises with construction equipment or other materials or equipment.

F. Assume full responsibility for the protection and safekeeping of products under this Contract, stored on the site.

G. Move any stored products, under Contractor's control, which interfere with operations of the Owner, public transportation, or property owners.

H. Contractor shall obtain and pay for use of storage or work areas needed for operations.

I. Contractor shall assume full responsibility for the protection and safekeeping of equipment, products, and materials stored on site.

J. Contractor shall notify and coordinate with Police Department, Fire Department, and Hospital/Ambulance Services. Notice shall include work schedule as construction proceeds, when work affects or obstructs intersections and streets, and when work is completed or suitable access is available in streets and intersections.

K. Contractor shall provide the name, address, and telephone number of person who has access to equipment and is authorized to make emergency repairs to Contractor's work, such as to correct trench cave-ins, move excavated material, and correct other problems during weekends and off-work hours, so access can be maintained for firefighting equipment, and to maintain barricades for public safety.

L. The Contractor must be satisfied through personal examination of the Site(s) as to all local conditions affecting their performance of the Contract. The Contractor is deemed to accept such conditions as found to exist.

M. The Contractor shall preserve all monuments, benchmarks, reference points, and stakes. In case of destruction thereof, the Contractor will be charged with expense of replacement and shall be responsible for any mistake or loss of time that may be caused. Permanent monuments or benchmarks which must be removed or disturbed shall be protected until properly referenced for relocation. The Contractor shall furnish materials and assistance for the proper replacement of such monuments or benchmarks.

N. Contractor shall notify and coordinate with right-of-way and easement owners. Notice shall include Work schedule as construction proceeds, when Work affects or obstructs intersections and streets, and when Work is completed or suitable access is available in streets or intersections.

O. Contractor shall notify and coordinate all Work within the BNSF railroad's right-of-way. Refer to above and to Section 00 73 00 for additional explanation of Contractor requirements.

P. Damaged Property:

1. Patch and or clean existing improvements and restore damage of property on, or adjacent to the Site(s) occasioned by the Work, including but not limited to, lawns, walks, driveways, roadways, curbs, pavements, structures, and utilities which are cut or damaged by operations and are not designated for removal, relocation, or replacement in the course of construction.
2. If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Owner. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.
3. Provide written acceptance of restoration by authority or Owner.

Q. Existing Facilities:

1. The Contractor shall take all necessary field measurements affecting all existing construction, piping, and equipment in this Contract and shall be solely responsible for proper fit between all Work under the Contract and existing structures, piping, and equipment.
2. Dimensions given on the drawings related to existing structures are based upon existing construction record drawings and it shall be the responsibility of the Contractor to verify the accuracy of all dimensions shown for existing structures, piping, and equipment. Any discrepancies shall be brought to the attention of the Engineer prior to the start of new construction or ordering of any materials. Contractor shall be responsible for any materials ordered that will not fit due to the failure to verify any discrepancies of existing structures, piping, and equipment prior to the start of new construction.

R. Existing Utilities:

1. Existing underground utilities, as shown on the drawings, are located in accordance with available data but locations shall be determined by the Contractor prior to beginning construction. A utility locate is required prior to any excavation.
2. Contractor shall protect all existing utilities and provide temporary removal and replacement or relocation as required for completion of the Work in the contract documents. No additional payment shall be made for this work.
3. Existing utilities not shown on the drawings and requiring relocation shall be exposed by the Contractor without damage. If damaged, the Contractor shall bear the responsibility and cost of repair or replacement.

S. Environmental Resources:

1. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this Contract. Confine activities to areas defined by the contract documents.
2. Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Owner. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted. All associated costs to accomplish this will be incidental to the Work.
3. Contractor may remove existing tree plantings smaller than 2-inches in diameter upon prior approval from Engineer/Owner. Tree shall be replaced by a tree of equivalent size and species, as selected by Owner. Contractor shall replace all existing landscaping, fabric, mulch, etc. to pre-

existing conditions. All costs for tree and landscaping cots shall be inciental to the Work.

4. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Maintain temporary erosion and sediment control measures such as fencing, berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.

T. See Section 01 50 00 for additional requirements.

1.04 OWNER OCCUPANCY REQUIREMENTS

A. Maintain suitable means of access for property owners abutting streets and highways and access roads involved in construction, except as specifically permitted otherwise by operations staff.

B. Cooperate with Owner to minimize conflict and to facilitate Owner’s operations. Schedule all Work to accommodate this requirement. No interruption will be permitted which adversely affects the degree of service the Owner provides. Contractor shall provide temporary facilities and make temporary modifications as necessary to keep the facilities in operation during the construction period.

C. Facility or Transmission Line shutdown time (if required for construction), if needed, during normal operating hours shall be pre-scheduled with Owner. Contractor must submit shutdown request in writing to Owner a minimum of seven (7) days in advance. Contractor shall allow 48 working hours between approval and shutdown for operator preparation. Owner may deny schedule if:

1. Contractor fails to follow request procedures.
2. Anticipated daily production requirements cannot be met during normal operating hours.
3. Other considerations cannot be met.

D. Work requiring planned facility shutdown, once undertaken, must be substantially completed to permit restart of facility within scheduled time. Critical Work elements may require continuous, non-stop work during or throughout the night to complete within schedule.

E. Pre-plan, schedule, coordinate, and stage for required materials, manpower, contractors, subcontractors, etc. to complete critical elements of Work.

F. Existing materials and equipment removed and not reused as part of the Work, and not identified elsewhere in the contract documents for salvage, shall be properly disposed of by the Contractor at no additional cost to Owner.

G. Owner must approve all proposed pipeline connections. Coordinate with Owner and Engineer a minimum of seven (7) days prior to taking an existing distribution line out of service. Owner may deny schedule if anticipated daily production requirements or other considerations cannot be met during normal operating hours, as defined as between the hours of 8:30 a.m. and 4:30 p.m.

1.05 ROAD RESTRICTIONS

A. Contractor shall take road restrictions into consideration. Road restrictions shall not be used as an excuse for missing deadlines and Contractor shall take road restrictions into consideration in preparing their lump sum bid price.

1.06 OTHER CONSTRUCTION REQUIREMENTS

A. Special Work Request

1. Saturday and Sunday work is allowed for the purposes of clean-up work only (no underground work shall be allowed) by the Contractor without prior written approval from the Engineer or Owner. Work shall not start on Saturday or Sunday before 9:00 am.
2. If the Contractor plans to conduct work other than clean-up work, the Contractor shall submit a Special Work Request to the Engineer and Owner for written approval. Engineer shall provide the Contractor with the appropriate form. All request shall be made at least two (2) weeks in advance of scheduled work. Engineer/Owner reserves the right to refuse Special Work Requests.
3. Special Work Request restrictions shall apply for Federal observed holidays. Contractor shall submit a Special Work Request if work is scheduled for these dates.

B. Initial Site Clean up

1. Contractor shall replace, compact, and level top soil as part of Substantial Completion requirements. The pipeline installation's backfilling, compaction, and grading shall be completed within one mile of ongoing project pipeline installation. Prior to mobilizing to a new location backfilling, compaction, and grading shall be completed. Landscape final landscaping and seeding shall be part of Final Completion..

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01 22 00
MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Measurement and payment criteria applicable to unit price Work.
2. Defect assessment and non-payment for rejected Work.

B. Related Sections:

1. Section 00 41 00 – Bid Form.
2. Section 00 52 00 – Agreement.
3. Section 00 72 00 – General Conditions.
4. Section 00 73 00 – Supplementary Conditions.
5. Section 01 10 00 – Summary of Work.
6. Section 01 23 00 – Contract Considerations and Alternates.
7. Section 01 26 00 – Contract Modification Procedures.
8. Section 01 29 00 – Progress Payment Procedures.
9. Section 01 31 13 – Project Coordination.
10. Section 01 33 00 – Submittal Procedures.
11. Section 01 77 00 – Closeout Procedures.

1.02 AUTHORITY

A. The Engineer and Owner will make final determinations regarding the completeness of Work, and subsequent payment of such Work.

B. The Engineer and Owner will take all measurements and compute quantities accordingly.

C. Contractor shall assist by providing necessary measurements, supporting data, and field data as required.

1.03 BID ITEMS

A. Quantities indicated in the Bid Form are for Bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Engineer shall determine payment.

B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit prices contracted.

C. No other items of Work required by the Drawings or Specifications shall be measured or paid for separately but shall be included as part of the listed item to which the Work pertains. Failure to list all such related Work in the following descriptions of items shall not invalidate this stipulation nor relieve the Contractor from his obligation for such Work.

1.04 PAYMENT

A. Payment Includes: Full compensation for all required mobilization, bonding, insurance, labor, skill, products, tools, equipment, transportation, services, incidentals, erection, application and installation of the Work; submittal of shop drawings, product data and operation and maintenance data or manuals, record data, start-up and system demonstration, where required; warranties, overhead and profit.

B. All items shall include traffic control, protection of the public, flag persons, construction signs, fences, barricades, transportation and disposal of excavated material, erosion control and stormwater pollution prevention, and cleaning, repair, and maintenance of haul routes.

C. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by the unit price for Work which is incorporated in or made necessary by the Work.

1.05 DEFECT ASSESSMENT

A. Replace the Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of the Engineer, it is not practical to remove and replace the Work, the Engineer will direct one of the following remedies:

1. The defective Work may remain, but the price will be adjusted to a new price at the discretion of the Engineer and Owner.
2. The defective Work will be partially repaired to the satisfaction of the Engineer and Owner, and the price will be adjusted at the discretion of the Engineer and Owner.

C. The authority of the Engineer and Owner to assess the defect and determine payment adjustment is final.

1.06 NON-PAYMENT FOR REJECTED PRODUCTS

A. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.

3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected Products.

1.07 CHANGES IN PLAN QUALITY

A. Plan quantities are based on assumed existing conditions and/or as stated in payment sections or notes. An increase or decrease from the number of units shown in the Bid Form shall not cause a change in the unit price except as allowed by the General Conditions.

1.08 DESCRIPTION OF UNIT PRICES FOR CONTRACT NO. 1 PIPELINE CONSTRUCTION: THE FOLLOWING DESCRIPTIONS ARE APPLICABLE TO THE CONTRACT.

A. **Mobilization, Bonding and Insurance, lump sum (l.s.):**

1. This item shall consist of all Work and operations, including, but is not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to and from the Project site; temporary lighting for construction; for the establishment and subsequent removal of all offices and storage facilities, Contractor's buildings, and other facilities necessary for Work on the Project; and for all bonding, insurance (excluding Railway Protection Insurance), licenses, fees, permits, and for all other Work and operations which must be performed, or costs incurred, prior to beginning and after completion of Work on the various items on the Project site.
2. When partial payments are made on the contract, payment for mobilization will be made according to the following schedule.
    a. When 5 percent of the original contract is earned, 25 percent of the amount bid for mobilization will be paid.
    b. When 10 percent of the original contract is earned, 50 percent of the amount bid for mobilization will be paid.
    c. When 25 percent of the original contract is earned, 60 percent of the amount bid for mobilization will be paid.
    d. When 65 percent of the original contract is earned, 90 percent of the amount bid for mobilization will be paid.
    e. When 80 percent of the original contract is earned, 100 percent of the amount bid for mobilization will be paid.

B. **SWPPP/Erosion Control and Sediment Control; lump sum (l.s.):** Lump sum includes, but is not limited to, all costs for installing, maintaining, inspecting, repairing, and removing all (SWPPP) controls required by the Contract, including silt fence, straw wattles, inlet protection, construction entrances, sediment basins, erosion control blankets, temporary seeding, and dust control.

C. **Traffic Control; lump sum (l.s.):** Lump sum includes, but is not limited to, cost for all labor, tools, materials, signs, barriers, pedestrian control, detour routes, temporary striping, message boards, flagmen, and equipment to provide traffic control for the full duration of the project in accordance with NDDOT standards and following the Manual on Uniform Traffic Control Devices (MUTCD) standards; develop and submit a traffic control plan for review; and acquiring permit(s) for road right of way work.

D. **Pre-Manufacturered Pump Station (Installation Only); lump sum (l.s.):** Lump sum includes, but is not limited to, all labor, equipment, tools, materials (excluding Owner-furnished pump station package), and incidentals required to install the Owner-supplied pre-manufactured pump station. Includes excavation, dewatering, sheeting, shoring, bracing, bedding; all materials, equipment, and installation of the concrete foundation and support structure as designed by the premanufactured pump station supplier; gravel foundation fill material; minor assembly of items that were shipped loose, setting of pump station, anchoring, connection to influent and effluent piping, electrical work, site restoration, testing, startup assistance, and coordination with pump manufacturer representative. Includes lifting equipment, rigging, temporary supports, and stabilization methods required for safe placement.

E. **Connect to Existing 24-inch DIP Effluent Pipeline; each (ea.):** Unit price includes, but is not limited to, all labor, equipment, tools, and materials necessary to make a complete, functional, leak-free connection to the existing 24-inch ductile iron effluent pipeline. Price includes excavation, dewatering, sheeting, shoring, bracing, materials and installation of new fittings, restraints, couplings, gaskets, tapping saddles, tapping the pipe, thrust restraints, backfilling, compaction, testing, and surface restoration.

F. **Open-Cut Water Main; linear foot (l.f.):** Unit price includes, but is not limited to, all cost for furnishing; handling; laying; materials; pipe; restraints; stiffeners; pipe fittings; fusing; act of fusing; and associated fittings; saddles and tapping saddles; special placing of bedding materials; removal and replacement of topsoil; trench excavation; dewatering; sheeting; shoring; bracing; backfilling with job excavated material or select backfill; compacting, compaction testing; clay check dams; leakage and hydrostatic pressure testing; pigging, recording as-built information; utility repair of utilities damaged by Contractor's operation; relocation of utilities that conflict with the proposed installation; coordination of utility relocation by the utility; connections to existing and new water main; thrust blocking of reaction backing; tracer wire; tracer wire access points; tracer wire anodes; tracer wire signs; pipe restraints and associated fittings; installation of a rebar marker and steel T-post marker for locating capped pipes; surface restoration; flag persons; warning lights; and barricades. Includes removal, transportation, and disposal of excess excavated material and cleaning, repair,

and maintenance of haul routes. Includes length of pipe within boring and receiving pits. Aggregate bedding, if required or chosen by the Contractor to be installed, shall be included in the unit price for various pipe sizes and material types listed in the Bid Form. Length will be measured along centerline of pipe with no deduction for fittings or valves. The cost for the installation of all fittings including fusing, restraints, and other appurtenances; shall be included in the price for open-cut water main and shall be considered incidental to the pipe.

1. Owner will hold a minimum of 5% retainage until completion of filling, flushing, and disinfection.
2. Payment will be made for various sizes, types, and classes listed in the Bid Form.

G. **Directional Bore Water Main; linear foot (l.f.):** Unit price includes, but is not limited to, all costs for furnishing; handling; installing; pipe; fittings; pipe materials including fusing and act of fusion; couplers; all other associated pipe materials; labor, tools, and equipment to bore and install pipeline; removal and replacement of topsoil; excavation; boring pits; receiving pits; pigging; intermediate connection or meter pits; removal of rocks; dewatering; sheeting; shoring; bracing; backfilling with job excavated material or select backfill; compaction and compaction testing; flushing; leakage and hydrostatic pressure testing; marker signs; recording as-built information; utility repair of utilities damaged by Contractor's operation; relocation of utilities that conflict with the proposed installation; coordination of utility relocation by the utility company; surface restoration; and flag persons, warning lights, and barricades. Includes removal, transportation, and disposal of excess excavated material; import of select backfill, if excavated material is unsuitable for compaction; cleaning, repair, and maintenance of haul routes; rock or other obstructions encountered during bores are incidental to contract, including large rock, cobble, and shale. Varying soil conditions (sand, rocks, etc.) encountered during the boring process shall be incidental to the cost. Payment will be made for various sizes listed in the Bid Form. Pay length shall be predetermined by Engineer as measured between the wooden lath installed by Engineer/Owner prior to pipeline installation. Payment shall include the costs for verification of the horizontal and vertical alignments shown on the Drawings. Payment shall be made for successfully completed Directional Bores. Defective bores, including bore hole abandonment and the costs to verify the alignments shown on the Drawings, shall not be measured for payment. All end connections for HDPE pipeline installation shall be fused. Couplers are not allowed within HDPE pipeline installation without Owner and Engineer approval.

H. **Cased Bores; linear foot (l.f.):** Lump sum price includes, but is not limited to, all costs for labor, tools, materials and equipment to push, jack, and bore or directionally drill casing pipe and carrier pipe; removal and replacement of topsoil; excavation; boring or jacking pits; intermediate connection or inspection pits; receiving pits; dewatering; sheeting; shoring; bracing; backfilling;

carrier/casing pipe of sizes and materials labeled on Drawings; fusion and act of fusing; pressure rating, and material labeled on drawings; marker signs; fusion and act of fusing; welding and act of welding; compaction and compaction testing; synthetic rubber pull-on end seal, stainless steel clamps, casing spacers, leakage and hydrostatic testing; utility repair of utilities damaged by Contractor's operation; completing, submitting, coordinating and paying for the any Department of Transportation/Railroad Entity coordination and flagging requirements, flag persons; warning lights; barricades; any erosion control or temporary construction entrances required by the any entity; and incidental work. Includes removal, transportation, and disposal of excess excavated material and cleaning, repair, and maintenance of haul routes. Payment will be made for the unit price listed in the Bid Form for the bores shown on the Drawings. All end connections within HDPE pipeline installation shall be fused. Couplers are not allowed within HDPE pipeline installation without Owner and Engineer approval. Payment for bores with a casing pipe shall include the cost for both the carrier pipe, casing pipe, and end seals. Payment will be made for various sizes, types, and classes listed in the Bid Form.

I. **Gate Valves; each (ea.):** Unit price includes, but is not limited to, all cost for: furnishing; handling; laying, setting; materials; fusing; act of fusing; valves, riser and cover; retainer glands; alpha end connections; restraints; trench adapters; polyethylene encasement; operating wrenches; bedding materials; special placing of bedding materials; removal and replacement of topsoil; trench excavation; dewatering; sheeting; shoring; bracing; backfilling with job excavated material or select backfill; compacting, compaction testing; leakage and hydrostatic pressure testing; disinfection; recording as-built information; utility repair of utilities damaged by Contractor's operation; coordination of utility relocation by the utility; connections to existing and new water main; marker signs; resting block; surface restoration; flag persons; warning lights; and barricades. Includes removal, transportation, and disposal of excess excavated material and cleaning, repair, and maintenance of haul routes. Payment will be made for various sizes listed in the Bid Form.

J. **Air Release/Vacuum Valve Assembly; each (ea.):** Unit price includes, but is not limited to, all cost for all cost for furnishing; handling; laying; setting; materials; PVC pipe, cover, air release/vacuum valve, corp stop, polyethylene pipe, service saddle or fused tee connection to main, pipe tap, fittings, couplings, adapters, insulation, extension handle and appurtenances; polyethylene encasement; trench excavation; dewatering; sheeting; shoring; bracing; removal and disposal of existing water main and appurtenances; joint restraints; bedding materials; special placement of bedding materials; backfilling with job excavating material or select backfill, including removal, transportation, and disposal of excess excavated material; compaction; compaction testing; marker signs;

flushing; leakage and hydrostatic pressure testing; recording as-built information; utility repair of utilities damaged by Contractor's operation.

K. **6-inch Fire Hydrant; each (ea.):** Unit price includes, but is not limited to, all costs for furnishing, handling, laying, setting, materials, appropriate ends, position indicators, gaskets, jointing materials, valves, actuators, riser box and cover, utility marker posts, trench adaptors, tracer wire, components and fittings, restrained couplings, couplings, stainless steel bolts/rods, polyethylene encasement, retainer glands, restraints, trench excavation, dewatering, sheeting, shoring, bracing, thrust blocking or reaction backing, valve blocking or restraints, resting block or concrete pad, bedding materials, special placement of bedding materials, backfilling with job excavated material or select backfill, compaction, compaction testing, flushing, leakage and hydrostatic pressure testing, sterilization, operating wrenches, recording as-built information, utility repair of utilities damaged by Contractor's operation, and coordination of utility with utility company to furnish and install valves as shown on the Drawings. Includes removal, transportation, and disposal of excess excavated material; fugitive dust control; import of select backfill (if excavated material is unsuitable for compaction); and cleaning, repair, and maintenance of haul routes. Unit price for Hydrants includes all fittings, beginning at and including the connection and tee or fusion tee, reducer, restraints, pipe, gate valve, hydrant, and all appurtenances associated with installing a fire hydrant.

L. **Drain Manhole; each (ea.):** Unit price includes, but is not limited to, all costs for furnishing, handling, and installing a complete 48-inch diameter precast concrete drain manhole, including excavation; preparation of subgrade; furnishing and placing precast base sections, riser sections, cones, grade rings, and adjustment rings; mortar, gaskets, casting, pipe connections, and joint seals; furnishing and installing a duckbill check valve on the end of the pipe installed within the drain manhole; furnishing and installing manhole frame and cover; pipe boots, couplings, grout, and all associated hardware; dewatering; sheeting, shoring, and bracing; bedding; backfilling with approved backfill; compaction and compaction testing; removal and replacement of topsoil; and surface restoration. No adjustments will be made for varying depths of drain manholes. The Drawings indicate the anticipated manhole depths at each location.

M. **Pressure Sustaining Valve Manhole; each (ea.):** Unit price includes, but is not limited to, all costs for furnishing, handling, and installing the complete pressure sustaining valve manhole structure, including precast concrete, manhole or vault access hatch and concrete covers, steps/ladder rungs, joint seals, gaskets, plain end by flanged ductile iron segments and their installations through the manhole structure walls; boots, couplings, grout, air/vacuum valve, pressure sustaining valve, check valve, pressure transmitter, and all associated hardware. Includes excavation; dewatering; sheeting, shoring, and bracing; bedding; backfilling with

approved backfill; compaction and compaction testing; removal and replacement of topsoil; and surface restoration.

N. **Pressure Reducing Valve Manhole; each (ea.):** Unit price includes, but is not limited to, all costs for furnishing, handling, and installing the complete pressure reducing valve manhole structure, including precast concrete, manhole or vault access hatch and covers, steps/ladder rungs, joint seals, gaskets, plain end by flanged ductile iron pipe segments and their installations through the manhole structure walls; boots, couplings, grout, pressure reducing valve, and all associated hardware. Includes excavation; dewatering; sheeting, shoring, and bracing; bedding; backfilling with approved backfill; compaction and compaction testing; removal and replacement of topsoil; and surface restoration.

O. **Class 5 Aggregate Base; (ton):** Unit price includes, but is not limited to, all costs for: labor; materials; equipment and incidentals for placing class 5 aggregate in streets, alleys, driveways and roadways. Measurement computed by vehicular weight clips from certified scale for actual gravel surface placed. Payment will be made for gravel surfacing when necessitated by approved construction methods. Class 5 aggregate surfacing shall be measured and paid only when prior authorization is given by Engineer. Price includes the cost of furnishing and installing geotechnical fabric, if required.

P. **Asphalt Paving - Public Street or Driveway; square yards (s.y.):** Unit price includes, but is not limited to, all costs for labor, tools, materials, geotextile fabric, aggregate base, concrete base, mix design, surface cleaning, surface preparation, tack coat, bituminous mix materials (aggregate and asphalt cement) placed at site; saw cutting, removal and disposal of existing asphalt; placement; compaction; rolling; testing; and clean-up, repair, and maintenance of haul routes; and cleanup of Work area. Protection of all existing gate valves, manholes, and inlet castings shall be considered incidental to this item.

Q. **Asphalt Paving - Bike Path; square yards (s.y.):** Unit price includes, but it not limited to, all costs for labor, tools, materials, geotextile fabric, aggregate base, mix design, surface cleaning, surface preparation, tack coat, bituminous mix materials (aggregate and asphalt cement) placed at site; saw cutting, removal and disposal of existing asphalt; placement; compaction; rolling; testing; and clean-up, repair, and maintenance of haul routes; and cleanup of Work area. Protection of all existing gate valves, manholes, and inlet castings shall be considered incidental to this item.

R. **Concrete Paving; square yards (s.y.):** Unit price includes, but is not limited to, furnishing and installing concrete pavement to the thickness and strength specified, including concrete, forms, reinforcing steel, dowels, joint materials, curing compounds, sawing joints, and all materials, labor, and equipment necessary for a complete installation. Includes removal and disposal; subgrade

preparation; shaping; removal of soft or unsuitable materials; placement and compaction of base course; quality control and testing; and surface finishing. Payment will be made for the various types listed in the Bid Form.

S. **Curb and Gutter; linear feet (l.f.):** Unit price includes, but is not limited to, furnishing and installing curb and gutter to the thickness and strength specified, including concrete, forms, reinforcing steel, dowels, joint materials, curing compounds, sawing joints, and all materials, labor, and equipment necessary for a complete installation. Includes removal and disposal of existing curb and gutter; subgrade preparation; shaping; removal of soft or unsuitable materials; placement and compaction of base course; quality control and testing; and surface finishing.

T. **Restoration and Seeding; acre (ac.):** Unit price includes, but is not limited to, all costs for labor; material; restoration; grading; import of soil material; equipment for preparation, furnishing, and placing topsoil, seed, fertilizer, herbicide, mulch, watering and incidentals for establishing and reestablishing lawns, berms, ditches, and other grass areas disturbed by construction; cleanup; and incidental work.

U. **Bollard; each (ea.):** Unit price includes, but is not limited to, all cost for furnishing, handling, and installing a permanent pipe bollard as detailed on the Plans, which includes a 6-inch diameter Schedule 40 steel pipe; filling pipe with concrete; excavation; placing concrete encasement/footing; setting bollard to the required height; providing slope to drain; surface restoration to match existing surface type; HDPE guard post covers; backfilling with approved material; compaction; removal and replacement of topsoil; and restoration of all disturbed areas.

V. **Water Level Control System; lump sum (l.s.):** Lump sum includes, but not limited to, all costs for furnishing, installing, configuring, testing, and placing into service the complete instrumentation and control (I&C) components of the Ponwater level control system as shown on the Plans and Specifications, including electrical work; pressure sensors, transmitters, control panels, control wiring/conduit, power supply, cable, conduit, and connections; communication cables, antennas if required, mounting hardware, and appurtenances; system integration; calibration; software programming; alarms; system checkout; functional testing; commissioning; and restoration of surfaces disturbed by installation.

W. **Drain Pipe Connection to Effluent Aeration (EA) Basin; lump sum (l.s.):** Unit price includes, but is not limited to, all labor, equipment, tools, and materials necessary to core drill an 8-inch diameter hole through the EA basin wall; install the pipe through the wall; install a link seal at the pipe penetration; and installation of an 8-inch duckbill check valve on the end of the pipe in the basin.

Work includes excavation, dewatering, sheeting, shoring, bracing, installation of new fittings, restraints, couplings, gaskets, thrust restraint, backfilling, compaction, testing, and surface restoration. The cost for the pipe and gate valve shall be paid for separately at the unit price costs for those items.

1.09 CHANGES IN PLAN QUANTITY

A. Plan quantities are based on assumed existing conditions and/or as stated in payment sections or notes. An increase or decrease from the number of units shown in the Bid Form shall not cause a change in the unit price except as allowed by the General Conditions.

1.10 INCIDENTAL ITEMS

A. Work required by the Contract Documents but not listed as a bid item shall be considered incidental to the Contract.

B. Clean-up and restoration of all Work areas, storage areas, and traffic and haul routes shall be considered incidental to the Contract, and shall be performed as required by the Contract Documents or as directed by the Engineer.

C. Repair of new and existing surfaces or features damaged by Contractor's Work operations shall be performed incidental to the Contract, and shall consist of restoration in-kind to the satisfaction of the Engineer.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01 23 00
CONTRACT CONSIDERATIONS AND ALTERNATES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Schedule of Values.
2. Alternates.

B. Related Sections include:

1. Section 01 11 00 - Summary of Work.
2. Section 01 29 00 – Progress Payment Procedures.
3. Section 01 26 00 – Contract Modification Procedures.
4. Section 01 33 00 – Submittal Procedures.
5. Section 01 61 00 – Common Product Requirements.
6. Division 31 – Earthwork.
7. Division 32 – Exterior Improvements.
8. Division 33 – Utilities.

1.02 SCHEDULE OF VALUES

A. Submit:

1. Typed schedule of values in format similar to EJCDC Application for Payment (form C-620, 2002 Edition).
2. In duplicate within fifteen (15) days after date of Owner-Contractor Agreement.
    a. Engineer will review Schedule of Values and provide revision comments to Contractor within 10 days of receipt from Contractor.
    b. Intent of Engineer's review will be to ensure format follows tracking and verification requirements per Project Zone and to coincide with Project completion dates.

B. Format:

1. Utilize the Table of Contents within Contract Documents.
2. Identify line items corresponding with number and title of Specification Section.
3. Identify site mobilization, bonds, and insurance.
4. Include within each line item a direct proportional amount of Contractor's overhead and profit.

C. Revise Schedule of Values to list approved Change Orders, and submit with each Application for Payment.

1.03 ALTERNATES

A. Not used.

PART 2 PRODUCTS

1.01 NOT USED.

PART 3 EXECUTION

1.01 NOT USED.

END OF SECTION

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. This section defines the procedures for proposing substitute items by "Approved Equivalent" manufacturers not listed in the specifications

B. Acceptance of "Approved Equivalent" manufacturers will be done by addendum to the bidding documents prior to bid date and time.

1.02 QUALIFICATIONS PACKAGE FOR NON-LISTED "APPROVED EQUIVALENT" PRODUCT CONSIDERATION

A. Bidders shall submit a qualification package at least ten (10) days prior to the date of receipt of bids for each proposed "Approved Equivalent" manufacturer not already listed as an acceptable or approved “manufacturer” in the specifications, which the Bidder proposes to furnish. Each qualification package shall be bound with protective cover, identified by specification section number and title, and the product manufacturer's name. The Bidder shall submit all qualification packages in a sealed, sturdy box or suitable container.

B. Qualification packages for non-listed "Approved Equivalent" items shall include the following: (if an item does not apply, indicate so in the submittal):

1. Completed Substitution Request Form. A copy of which can be found attached to the end of this section.
2. A complete set of drawings, specifications, catalog cut-sheets, and detailed descriptive material. This information shall identify all technical and performance requirements stipulated on each drawing and in each specification section. Include all items required for shop drawing review.
3. Provide marked-up product information showing side-by-side comparisons for both the specified products and proposed products
4. Detailed information for all buy-out items such as hardware, motors, bearings, reducers, belts, sheaves, motor controllers and instrumentation.
5. Lists showing materials of construction of all components, including all buy-out items.
6. Manufacturer's recommended spare parts, including all buy-out items.
7. Information on equipment field erection requirements including total weight of assembled components and weight of each sub-assembly.
8. A maintenance schedule showing the required maintenance, frequency of maintenance, lubricants and other items required at each regular preventative maintenance period, including all buy-out items.
9. Electrical requirements and schematic diagrams.

10. Detailed written documentation with discussion of all deviations of equipment, including buy-out items, from the Contract Documents.
11. A list of all process, mechanical, electrical, and structural changes and requirements for incorporating the "Approved Equivalent" into the project.
12. A listing of the manufacturer's history. Unless specified otherwise in applicable specification sections, manufacturer's history is to demonstrate a minimum of three (3) years' experience and a minimum of three (3) successful installations of the size and complexity involved in this project. Provide a complete installation list with contact names and telephone numbers.
13. Documentation easily identifying that the proposed substitution meets or exceeds the specified warranties

C. Failure to furnish the preceding information at least ten (10) days prior to the date of receipt of bids shall be cause for rejection of a proposed alternate item for use on this project.

D. No "Approved Equivalent" items will be considered unless, in the opinion of the Engineer, they conform to the Contract Documents in all respects, except for make and manufacturer and minor details.

E. The Engineer shall be the sole authority for determining conformance of a proposed "Approved Equivalent" item with the Contract Documents. Except for identification of non-compliance with the specifications, the Engineer will not be required to prove that an "Approved Equivalent" item is not equal to "Basis of Bid" items.

F. Substitutions or modifications to the qualification package will not be considered after opening of Bids.

G. Acceptance of "Approved Equivalent" items and their qualification packages, does not eliminate the need for shop drawing submittals and reviews during construction, nor does it eliminate the requirement that the seller satisfy the requirements of the Contract Documents.

1.03 BID REQUIREMENTS

A. Bidders proposing to furnish "Approved Equivalent" items that require changes to the Contract Documents shall notify the Engineer in writing of all process, mechanical, electrical and structural changes and requirements for incorporating the "Approved Equivalent" into the Project and shall reimburse the Owner for associated redesign costs. Redesign and contract drawing revisions to accommodate the "Approved Equivalent" will be prepared by the Engineer during the shop drawing review process. Reimbursement shall be based on the Engineer's standard hourly rates plus reimbursable expenses at cost.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

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SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Submittals.
2. Documentation of Change in Contract Price and Contract Time.
3. Change Procedures.
4. Work Change Directive.
5. Stipulated Price Change Order.
6. Time and Material Change Order.
7. Execution of Change Orders.
8. Correlation of Contractor Submittals.

B. Related Sections include:

1. Section 00 52 00 – Agreement Form.
2. Section 00 63 49 – Work Change Directive Form.
3. Section 00 63 63 – Change Order Form.
4. Section 00 72 00 – General Conditions.
5. Section 00 73 00 – Supplementary Conditions.
6. Section 01 29 00 – Payment Procedures.
7. Section 01 33 00 – Submittal Procedures.
8. Section 01 61 00 – Common Product Requirements.
9. Section 01 77 00 – Closeout Procedures.

1.02 SUBMITTALS

A. Submit name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. Change Order Forms: Engineers Joint Contract Document Committee (EJCDC) form C-941 (2013 Edition).

1.03 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

A. Maintain detailed records of work done on a time and material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.

B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.

C. Provide additional data to support computations:

1. Quantities of products, labor, and equipment.
2. Taxes, insurance, and bonds.
3. Overhead and profit.
4. Justification for any change in Contract Time.
5. Credit for deletions from Contract, similarly documented.

D. Support each claim for additional costs, and for work done on a time and material basis, with additional information:

1. Origin and date of claim.
2. Dates and times work was performed, and by whom.
3. Time records and wage rates paid.
4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

1.04 CHANGE PROCEDURES

A. The Engineer will advise of minor changes in the Work not involving an adjustment to Contract Price or Contract Time by issuing supplemental instructions.

B. The Engineer may issue a Proposal Request that includes a detailed description of a proposed change with supplementary or revised Drawings and specifications and a change in Contract Time for executing the change. Contractor will prepare and submit an estimate within five (5) days.

C. The Contractor may propose a change by submitting a request for change to the Engineer, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors.

1.05 WORK CHANGE DIRECTIVE

A. Engineer may issue a document, signed by the Owner, instructing the Contractor to proceed with a change in the Work, which may require subsequent inclusion in a Change Order if any change in Contract Price or Contract Time is required.

B. The document will describe changes in the Work, and will designate method of determining any change in Contract Price or Contract Time. A work change directive will not include any change in Contract Price or Contract Time without written notice and approval by the Engineer for inclusion in a Change Order.

C. Promptly execute the change in Work.

1.06 STIPULATED PRICE CHANGE ORDER

A. Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Engineer.

1.07 TIME AND MATERIAL CHANGE ORDER

A. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

B. Engineer will determine the change allowable in Contract Price and Contract Time as provided in the Contract Documents.

C. Maintain detailed records of work done on Time and Material basis.

D. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

1.08 EXECUTION OF CHANGE ORDERS

A. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract. The form to be used shall be that indicated in Paragraph 1.02.B of this Section. Engineer will then present the proposed signed Change Order to Owner for approval. Upon obtaining approval, the Change Order will be submitted to the Owner for signatures as provided in Conditions of Contract.

1.09 CORRELATION OF CONTRACTOR SUBMITTALS

A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price.

B. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

C. Promptly enter changes in Project Record Documents.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

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SECTION 01 29 00
PROGRESS PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Format and Preparation of Applications.
2. Schedule of Values.
3. Submittal Procedures.
4. Substantiating Data.

B. Related Sections include:

1. Section 00 52 00 – Agreement.
2. Section 00 72 00 – General Conditions.
3. Section 01 23 00 – Contract Considerations and Alternates.
4. Section 01 26 00 – Contract Modification Procedures.
5. Section 01 33 00 – Submittal Procedures.
6. Section 01 77 00 – Closeout Procedures.

1.02 FORMAT AND PREPARATION OF APPLICATIONS

A. Utilize: Engineers Joint Contract Document Committee (EJCDC) Application for Payment Form (C-620, 2002 Edition).

B. Preparation

1. Present required information in typewritten form.
2. Execute certification by signature of authorized officer.
3. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.
4. List each authorized Change Order as an extension on Continuation Sheet, listing Change Order number and dollar amount as for an original item of Work.
5. Prepare Application for Final Payment as specified in Section 01 77 00.

1.03 SUBMITTAL PROCEDURES

A. Submittals

1. Three (3) copies of each Application for Payment.
2. Updated construction schedule with each Application for Payment.
3. Payment Periods: As stipulated in the Agreement.

4. Submit with transmittal letter as specified for Submittals in Section 01 33 00.
5. Administrative actions which must precede or coincide with submittal of final application for payment include:
    a. Submit lien waivers, warranties and bonds, and project record documents with final application for payment.
    b. Completion of all work not included in substantial completion as defined in General and Supplementary Conditions.
    c. Completion of project closeout procedures as indicated in Section 01 77 00.
    d. Removal of temporary facilities and services.
    e. Removal of surplus materials, rubbish, or similar elements.
    f. Final cleaning.
    g. Transmittal of project construction record documents to Owner and Engineer.
    h. Consent of surety for final payment.

1.04 SUBSTANTIATING DATA

A. When Engineer requires substantiating information, submit data justifying dollar amounts in question.

B. Provide one (1) copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

C. Provide copies of invoice(s) for payment of materials stored on-site. Payment will not be made for materials that are not stored on-site or within a bonded warehouse that has been approved by Engineer and Owner.

D. Contractor shall supply substantiating information in compliance with federal and state requirements for monthly utilization reports and weekly prevailing wage and labor rates for laborers on-site.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01 31 13
PROJECT COORDINATION

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes:

1. Coordination and project conditions.
2. Project Schedules
3. Field engineering.

B. Related Sections include:

1. Section 01 10 00 – Summary of Work.
2. Section 01 26 00 – Contract Modification Procedures.
3. Section 01 29 00 – Progress Payment Procedures.
4. Section 01 31 19 – Project Meetings.
5. Section 01 33 00 – Submittal Procedures.
6. Section 01 77 00 – Closeout Procedures.

1.02 COORDINATION AND PROJECT CONDITIONS

A. General:

1. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
2. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
3. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's partial occupancy.
4. Coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

B. Responsibilities of the Contractor:

1. Coordinate construction schedule and operations with Owner and Engineer to accommodate Owner occupancy requirements. Utilize description of critical events in Section 01 12 16 as a guideline for scheduling and undertaking the Work.

2. Contractor shall submit an initial proposed Work Schedule to the Engineer 15 days prior to the start of construction. The Work Schedule shall:
    a. Be in the form of a gantt chart with anticipated dates and duration indicated.
    b. Include all major aspects of the Work as included within the Contract Documents.
    c. Include a breakdown of each major aspect of the Work into smaller tasks with sufficient detail to explain the construction process from start to finish.
    d. Include sketches and/or drawings of critical components if required to complete or supplement a portion of the Work Schedule.
3. Contractor shall schedule and conduct construction to insure Owner's continual use of the system with minimal interruption.
4. During the construction period, coordinate construction schedule and operations with the Owner and Engineer.
5. To meet anticipated water demand and water quality objectives, it is imperative that the contractor is successful at completing portions of the project according to the project completion dates.
6. Cooperate with and coordinate Work with other Contractors and the Construction Coordinator to facilitate the general progress of the Project and to prevent delaying the progress of the other Contractors.
7. Afford other Contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their Work.
8. Connect and coordinate Work with other Contractors Work as required by the Contract Documents.
9. After notification by other Contractors or the Engineer of the need to accomplish a particular phase or element of the Work, the Contractor shall, within a reasonable time, perform his Work so as not to delay or impede the other Contractors.
10. Cooperate with Construction Coordinator in scheduling and performance of the Work.
11. Allocate and coordinate use of Site for field offices and construction trailers and for access, traffic, and parking facilities.
12. Instruct and coordinate the use of temporary utilities and construction facilities.
13. Coordinate the Work of the individual Contractors.
14. Submit (and revise) progress schedule in accordance with Section 01 33 00 – Submittal Procedures coordinating the entire project construction schedule.
15. Organize and submit Applications for Payment. Submit applications on EJCDC C-620 forms for review by Engineer.
16. Submit shop drawings, product data, and samples in accordance with Section 01 33 00 – Submittal Procedures.

17. Submit request for interpretation of Contract Documents and obtain instructions through Engineer.
18. Process requests for Change Orders through Engineer.
19. Organize all closeout submittals and preliminary inspection reports for transmittal to Engineer. Organize all record drawings and submit to Engineer. Review all drawings before submitting to Engineer.
20. Notify Engineer when all trades are ready for final inspection and organize Substantial and Final inspections.
21. Provide record drawing information to Engineer.
22. Ensure punch list items are completed prior to scheduling final inspection by Engineer.

1.03 FIELD ENGINEERING

A. Control datum for construction that is shown on Drawings.

B. Contractor shall locate and protect survey control and reference points.

C. Contractor shall confirm Drawing dimensions and elevations. Notify Engineer concerning errors or ambiguities.

D. Contractor shall establish and maintain required elevations, lines, and levels utilizing recognized engineering practices. Obtain services of a licensed surveyor as required to assure Work is installed per Drawing dimensions and elevations.

E. Site service utilities are shown in their approximate locations on the Drawings. Contractor shall be responsible to field verify all utility locations as required to accommodate construction activities.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

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SECTION 01 31 19
PROJECT MEETINGS

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes:

1. Preconstruction meeting.
2. Site mobilization meeting.
3. Progress meetings.
4. Pre-installation meeting.

B. Related Sections include:

1. Section 01 10 00 – Summary of Work.
2. Section 01 26 00 – Contract Modification Procedures.
3. Section 01 29 00 – Progress Payment Procedures.
4. Section 01 31 13 – Project Coordination.
5. Section 01 33 00 – Submittal Procedures.
6. Section 01 77 00 – Closeout Procedures.

1.02 PRECONSTRUCTION MEETING

A. Engineer will schedule a preconstruction kick-off meeting after Notice of Award.

B. Attendance required by

1. Contractor.
2. Contractor's superintendent.
3. Owner.
4. Engineer.
5. Major Subcontractor(s).

C. Agenda:

1. Contract Forms and Conditions of the Contract.
2. Distribution of Contract Documents.
3. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
4. Designation of personnel representing the parties in Contract, and the Engineer.
5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
6. Scheduling.

7. Use of premises by Owner and Contractor.
8. Survey and construction staking.
9. Procedures for testing.
10. Inspection, testing, and acceptance of materials during construction.
11. Procedures for maintaining record documents.

D. Engineer will record minutes and distribute copies after meeting within fourteen (14) days to participants and those affected by decisions made.

1.03 SITE MOBILIZATION MEETING

A. Engineer and Owner will schedule a meeting prior to Contractor occupancy.

B. Attendance required by:

1. Contractor(s).
2. Contractor's Superintendent(s).
3. Owner.
4. Engineer.
5. Major Sub-Contractor(s).

C. Agenda:

1. Use of premises by Owner and Contractor.
2. Owner's requirements and partial occupancy.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by
5. Survey and building
6. Security and housekeeping procedures.
7. Procedures for testing.
8. Requirements for start-up of equipment.
9. Inspection and acceptance of equipment put into service during construction period.
10. Procedures for maintaining record documents.

D. Engineer will record minutes and distribute copies after meeting within fourteen (14) days to participants and those affected by decisions made.

1.04 PROGRESS MEETINGS

A. Engineer will:

1. Schedule and administer meetings at the Project site throughout progress of the Work at weekly intervals, or as deemed necessary by the Engineer.
2. Make arrangements for hosting meetings.

3. Determine if alternative meeting venues are acceptable to Owner, Engineer, and Contractor. Potential for off-site or video conference meetings will be determined.

B. Attendance required by:

1. Contractor(s)
2. Contractor(s) Job Superintendent.
3. Owner.
4. Engineer.
5. Major Sub-Contractors and suppliers.
6. Others as appropriate to agenda topics for each meeting.

C. Agenda:

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

D. Engineer will record minutes and distribute copies within fourteen (14) days after meeting to participants and those affected by decisions made.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

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SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes:

1. Submittal Procedures.
2. Submittal Schedules
3. Construction Progress Schedules.
4. Proposed Products List.
5. Tabulation of Subcontractors.
6. Tabulation of Suppliers.
7. Product Data.
8. Request for Interpretation
9. Shop Drawings.
10. Samples.
11. Test Reports.
12. Manufacturer’s Certificates.
13. Manufacturer's Instructions.
14. Manufacturer's Field Reports.
15. Excessive Shop Drawing Reviews.

B. Related Sections include:

1. Section 01 45 00 – Quality Control.
2. Section 01 77 00 – Closeout Procedures.
3. Section 01 78 23 – Operations and Maintenance Data.

1.02 SUBMITTAL PROCEDURES

A. Transmit each submittal with Engineer accepted form.

B. Sequentially number the transmittal form. Submit revised submittals with original number and a sequential alphabetic suffix.

C. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.

D. Contractor shall completely review all submittal materials prior to submission to Engineer. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

E. Schedule submittals to expedite the Project, and deliver to Engineer at business address. Coordinate submission of related items.

F. Engineer will attempt to complete a review of each submittal in a timely manner within 30 calendar days of receipt of each submittal. Failure of Engineer to review a submittal within the estimated review timeframe shall not be basis for the Contractor to request or receive additional Contract Price or Contract Time.

G. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work. Highlight and/or clearly designate specific product details and information so as to confirm product meets or exceeds Specifications.

H. Provide space for Contractor and Engineer review stamps.

I. When revised for resubmission, identify all changes made since previous submission.

J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements. Clearly transmit Engineer review comments to suppliers and subcontractors as required to minimize product delivery errors and miscommunications.

K. Submittals not requested will not be recognized or processed.

L. Engineer will review submittals in order received unless Contractor requests, in writing, a revised order of review. A revision in order may add to the length of review time required for previously submitted submittals.

M. Submittal of more than three major submittals per week may add to the required length of review time. Engineer shall notify Contractor of submittal review scheduling conflicts.

1.03 SUBMITTAL SCHEDULES

A. Contractor shall submit a schedule of estimated submittal dates for shop drawings, product data, and samples at the onset of the Project as required by the Construction schedule.

B. The submittal schedule shall identify specification sections and anticipated submittal dates. Indicate any critical submittals and dates for Engineer’s review.

C. Provide decision dates for selection of finishes and samples.

1.04 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedule in duplicate within fifteen (15) days after date of Owner-Contractor Agreement.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version. Application for Payment will not be processed until updated construction schedule has been submitted.

D. Prepare schedules as a horizontal bar chart with separate bar for each major portion of Work or operation, identifying first workday of each week as well as the proposed start and completion dates of each major portion of Work.

E. Sheet Size: Minimum 11x17 inches. Larger sizes than 11x17 inches shall be in multiples of 8½x11 inches.

F. Content

1. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction. Indicate the early and late start, early and late finish, float dates, and duration.
2. Identify each item by Specification section number.
3. Identify Work of separate stages and other logically grouped activities.
4. Provide sub-schedules to define critical portions of the entire schedule.
5. Include conferences and meetings in schedule.
6. Indicate estimated percentage of completion for each item of Work at each submission.
7. Provide separate schedule of submittal dates for shop drawings, product data, and samples, and dates reviewed submittals will be required from Engineer. Allow sufficient time for review by Engineer. Indicate decision dates for selection of finishes.
8. Coordinate content with schedule of values.

G. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule.

H. Distribution

1. Distribute copies of reviewed schedules to Project Site file, Subcontractors, suppliers, and other concerned parties.
2. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

1.05 PROPOSED PRODUCTS LIST

A. Within fifteen (15) days after date of Owner-Contractor Agreement, submit list of major Products proposed for use, with name of manufacturer, trade name, and model number of each Product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.06 TABULATION OF SUBCONTRACTORS

A. Contractor shall submit a complete list of subcontractors who will provide work on the project.

B. The submitted list shall include the following information for each subcontractor:

1. Name
2. Address
3. Type of work to be provided
4. Applicable specifications sections
5. Contact person

C. Contractor’s use of specific subcontractors shall be subject to the requirements included in the specifications.

1.07 TABULATION OF SUPPLIERS

A. Contractor shall submit a list of suppliers who will provide materials, equipment, or components, which are integral to the Work.

B. The submitted list shall include the following information for each supplier:

1. Name
2. Address
3. Type of work to be provided
4. Applicable specifications sections
5. Contact person

C. Contractor's use of specific suppliers for providing equipment, materials, or components shall be subject to the requirements of the specifications.

1.08 REQUESTS FOR INTERPRETATION

A. Contractor/Contractor shall submit in writing all requests for interpretation or for information regarding the Contract Documents on the form provided by the Engineer.

B. Engineer does not guarantee that a response can be provided in the amount of time requested, but Engineer shall respond in writing to Contractor/Contractor’s request within a reasonable amount of time given the extent of the request for interpretation of information required.

1.09 PRODUCT DATA

A. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

B. After review, provide copies and distribute in accordance with Submittal Procedures article above and for record document purposes described in Section 01 77 00.

C. Submit the number of copies that the Contractor requires, plus the number of copies as specified in Paragraph 1.02.

D. Mark each copy to identify applicable Products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

E. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service of functional equipment and appliances.

1.10 SHOP DRAWINGS

A. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

B. After review, produce copies and distribute in accordance with Submittal Procedures article above and for record document purposes described in Section 01 77 00.

C. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Submit in electronic format for Engineer’s review. Upon approval and prior to project completion, Contractor shall submit up to two (2) bound hard copies, containing all approved submittals, to be retained by Engineer and Owner.

E. All shop drawings shall be submitted through the Contractor in accordance with the procedures outlined in this specification. Shop drawings received from anyone other than through the Contractor will not be reviewed.

F. Shop drawings shall include data and technical drawings prepared specifically for this Project, including where required, but not limited to the following:

1. Fabrication drawings
2. Installation drawings

3. Shopwork manufacturing instructions
4. Templates or patterns
5. Coordination drawings
6. Schedules
7. Design calculations

G. Shop drawings shall contain complete detail showing conformance with the Contract Documents and such other specified information as required, including but not limited to the following

1. Related work with applicable cross references
2. Physical configuration
3. Dimensional information, including any variations from actual conditions
4. List of materials
5. Structural construction and assemblies
6. Anchor bolt details showing type, size, embedment, and locations
7. Machinery and equipment details
8. Auxiliary items to machinery and equipment
9. Protective coatings and factory finishes
10. Electrical information including motor sizes, wiring and circuit diagrams, and instrumentation
11. Testing results

H. Detail all connections required to complete the work.

I. Approval of shop drawings by Engineer shall not relieve the Contractor/Contractor from responsibility of deviations from drawings or specification, unless deviations or changes have been brought to Engineer's attention at time of submission, nor shall it relieve the Contractor/Contractor from responsibility for errors or omissions in shop drawings.

1.11 SAMPLES

A. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

B. After review, produce duplicates and distribute in accordance with Submittal Procedures article above and for record document purposes described in Section 01 77 00.

C. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

D. Include identification on each sample, with full Project information.

E. Submit the number of samples specified in individual Specification sections; one (1) of which will be retained by Engineer.

F. Reviewed samples that may be used in the Work are indicated in individual Specification sections.

G. Samples will not be used for testing purposes unless specifically stated in the Specification section.

1.12 TEST REPORTS

A. Submit for the Engineer's knowledge as Contract Administrator or for the Owner.

B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

C. Retain one (1) copy of all test reports and results on-site in a location accessible to Engineer.

1.13 MANUFACTURER’S CERTIFICATES

A. When specified in individual Specification sections, submit certification by the manufacturer, installation/application Subcontractor, or the Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.14 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

C. Refer to Section 01 45 00 – Quality Control, Manufacturers' Field Services article.

1.15 MANUFACTURER'S FIELD REPORTS

A. Submit reports for the Engineer's benefit as Contract Administrator or for the Owner.

B. Submit report in duplicate within fifteen (15) days of observation to Engineer for information.

C. Submit the manufacturer's field reports for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

1.16 INSTALLATION PLAN AND GRADE CONTROL

A. Submit description of proposed construction plan, plan to establish and maintain vertical and horizontal alignment, plan to maintain borehole stability, and drilling fluid and mud recovery process, as applicable to boring method.

B. Submit description of proposed construction plan, plan to establish and maintain vertical and horizontal alignment as applicable to open-cut methods.

C. **Submit for Engineer's approval prior to construction, information on Contractor proposed grade control equipment including, but not limited to, equipment operation, accuracy, and capabilities to record and verify final grade.**

D. See Sections 01 45 00, 31 23 16, 33 05 07, and 33 10 00 for required accuracy.

1.17 EXCESSIVE SHOP DRAWING REVIEWS

A. The maximum number of submittal reviews for any one product or specification section shall be two (2).

B. Compensation for third or subsequent reviews will be required as outlined below:

1. Owner will compensate Engineer for "additional services".
2. Owner will deduct amount of such compensation from payment to Contractor.
3. Engineer's compensation shall be at Engineer's standard hourly rates, plus reimbursable expenses at cost.

PART 2 PRODUCTS

2.01 NOT USED.

PART 3 EXECUTION

3.01 NOT USED.

END OF SECTION

SECTION 01 45 00
QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Quality Assurance - Control of Installation.
2. Tolerances.
3. References and Standards.
4. Inspection and Testing Services.
5. Mill Tests.
6. Factory Tests.
7. Manufacturer's Instructions.
8. Manufacturer's Certificates.
9. Manufacturer's Field Services.
10. Qualification Tests.
11. Laboratory Tests.
12. Product Field Tests.
13. Material Field Tests.
14. Coating Field Tests.
15. Mock-Up.

B. Related Sections include:

1. Section 01 10 00 – Summary of Work.
2. Section 01 33 00 – Submittal Procedures.
3. Section 01 75 00 – Starting and Adjusting.

1.02 QUALITY ASSURANCE - CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturer’s instructions, including each step in sequence.

C. Should manufacturer’s instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Constructed to lines, grade, and dimensions as detailed on construction Drawings and within tolerances specified later in this section. Install all pipeline in strict accordance with manufacturers recommendations and deflection limits.

E. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

F. Perform Work by persons qualified to produce required and specified quality.

G. Verify that field measurements are as indicated on Contract Drawings, shop drawings, or as instructed by the manufacturer.

H. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

I. Completed Work shall be plumb, level, true to line or plane, and free from damage.

1.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.

1. Grade Control
   a. Submit for Engineer's approval prior to construction, information on Contractor proposed grade control method and equipment including, but not limited to, equipment operation, accuracy, and capabilities to record and verify Grade Control.
   b. Pipeline installation shall be installed with a maximum horizontal tolerance of +/- 2.00’ for open-cut, trenched, plowed and bored pipeline.
   c. Pipeline installation shall be installed with a maximum vertical tolerance of +/- 0.20’ for open-cut and bored pipeline.
2. Comply with manufacturers' recommendations and tolerances, including deflection limits. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
3. Adjust Products to appropriate dimensions; position before securing Products in place.

1.04 REFERENCES AND STANDARDS

A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. Neither the contractual relationships, duties, nor responsibilities of the parties in Contract or those of the Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 TESTING RESPONSIBILITIES

A. Contractor's Responsibility:

1. Contractor shall be responsible for all quality control testing or inspections including mill tests, factory tests, qualification tests, laboratory tests, and field tests.
2. Quality control required by codes or ordinances, or by the plan approval authority, unless otherwise provided in the Contract Documents.
3. Contractor shall bear the cost of convenience testing.
4. Coordinate with each independent agency to accommodate required services with minimum delay in progress of work, and to avoid moving or replacing work. Schedule times for quality control services.
5. Cooperate with independent agencies performing required quality control services. Notify testing agency sufficiently in advance of operations to permit assignment of personnel. Provide auxiliary services as required, including, but not limited to the following:
   a. Providing access to work
   b. Taking samples or assistance with taking samples
   c. Delivery of samples to testing laboratories
   d. Security and protection of samples and test equipment at Site

B. Owner's Responsibility: The Owner shall provide the following services at no cost to the Contractor except as required for retests as defined in the Contract Documents:

1. Owner's responsible quality control shall be specifically indicated. If quality control measure is not indicated as Owner responsibility it is the Contractor's responsibility.

C. Retesting Responsibility:

1. Where results of quality control prove unsatisfactory and do not indicate compliance with Contract Documents all costs associated with retesting is the Contractor's responsibility.
2. The costs for retesting of Owner responsible quality control shall be deducted from the Contract amount by supplemental agreement.

1.06 INSPECTION AND TESTING SERVICES

A. Contractor will employ services of an independent firm to perform inspection and testing. Contractor shall pay for all services required.

B. The independent firm will perform tests and other services specified in individual specification sections and as required by the Engineer.

C. Testing and source quality control may occur on or off the Site. Perform off-Site testing as required by the Engineer or the Owner.

D. Reports will be submitted by the independent firm to the Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Engineer and independent firm 48 hours prior to expected time for operations requiring services.
2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

F. Testing does not relieve Contractor from performing Work according to Contract requirements.

G. Re-testing required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Engineer. Payment for re-testing will be paid by the Contractor.

H. Contractor shall select independent testing agency qualified in accordance with referenced ASTM standards and that is acceptable to the Engineer, if required for certain types of testing.

I. Comply with pertinent codes, regulations, and industry standards except when more stringent standards or tolerances are specified.

1.07 FACTORY TEST

A. Factory tests of process, mechanical, and electrical equipment relative to performance, capacity, rating, efficiency, or other such requirements shall be conducted in the factory or shop for each item supplied when this type of test is specified.

B. Factory testing shall be performed in accordance with applicable standards and test codes.

C. Where factory tests are required or specified, reports of the test results shall be submitted to Engineer for approval prior to shipment. Contractor shall submit the number of test reports for approval required by the Contractor plus four (4) copies to be retained by the Engineer.

D. Factory observation of fabrication procedures, materials used, and testing methods may be performed by a representative of the Owner or Engineer. Owner shall pay for factory observation.

1.08 MANUFACTURERS' INSTRUCTIONS

A. Comply with manufacturer’s instructions in full detail for storage, installation, assembly, installation, start-up, and adjustment. Contractor shall follow appropriate sequencing as recommended by manufacturer.

B. Should manufacturer’s instructions conflict with Contract Documents, Contractor shall request clarification from Engineer prior to proceeding.

C. If required by individual product or equipment specification sections, Contractor shall submit manufacturer’s printed instructions prior to assembly and installation.

1.09 MANUFACTURERS' CERTIFICATES

A. Submit manufacturer’s certificate indicating that equipment or products meet or exceed specified requirements where required in the individual specification sections.

B. Certificates shall be submitted prior to shipment of equipment or products.

1.10 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and other services as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer subject to approval of Engineer.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. Refer to Section 01 33 00.

1.11 QUALIFICATION TESTS

A. Should a product, material, or method for assembly of unknown or questionable quality be proposed by the Contractor, additional tests may be required by Engineer.

B. Additional testing as required by the Engineer shall be used as a basis to establish acceptance or rejection.

1.12 LABORATORY TESTS

A. Laboratory tests shall be conducted, and test reports shall be submitted where this type of test is specified. All laboratory tests shall be made by an independent laboratory approved by the Engineer. These tests shall be performed in accordance with applicable ASTM standards.

B. Laboratory tests may be witnessed by representatives of the Owner or Engineer.

C. Submit two (2) copies of all laboratory tests to the Engineer for record.

1.13 PRODUCT FIELD TESTS

A. Product field tests shall be set up and completed by the Contractor. Contractor shall provide all tools, equipment, instruments, personnel, and other facilities required for the completion of each test.

B. Product field tests of process equipment, mechanical systems, electrical systems, piping systems, and similar facilities shall be conducted where this type of test is specified.

C. Product field tests include the determination of performance, capacity, efficiency, function, tightness, leakage, and other special requirements. Product field tests shall be performed in accordance with applicable standards and test codes.

D. Product field tests may be witnessed by representatives of Owner and Engineer.

1.14 MATERIALS FIELD TESTS

A. Routine tests of materials incorporated into the Project will be performed by an independent testing laboratory. Contractor shall coordinate and schedule all testing.

B. Results of materials field testing shall be reported to the Engineer and Contractor.

C. Material field tests may be witnessed by representatives of the Owner, Engineer, and Engineer’s subconsultant and such witnessing shall be paid for by the Owner.

D. Contractor shall provide for at least two different certified gradation tests from each source of granular materials provided for the project site or one (1) sample from each 1,500 tons of finished product used. Certified gradation tests shall be done in accordance with ASTM C136 and be performed by the independent testing laboratory hired by the Contractor.

E. Contractor shall provide at least two (2) different certified moisture-density relationship (compaction curve) tests from each source of materials provided to

the project site. Certified moisture-density relationship tests shall be done in accordance with ASTM D698 and be performed by the independent testing laboratory hired by the Contractor.

F. The compaction inspections and testing shall be conducted by the independent testing laboratory hired by the Contractor and accepted by the Engineer with results being reported to the Contractor and Engineer. See Section 31 23 23 for compaction schedule and requirements.

1.15 MOCK-UP

A. Tests will be performed under provisions identified in this Section and identified in the respective product specification Sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining work.

D. Where mock-up has been accepted by Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Temporary Lighting for Construction Purposes.
2. Temporary Heating.
3. Temporary Piping and Plumbing.
4. Telephone/Email Service.
5. Temporary Water Service.
6. Temporary Sanitary Facilities.
7. First Aid Facilities.
8. Fencing.
9. Barriers.
10. Water Control.
11. Enclosures.cmar
12. Temporary Controls.
13. Protection of Installed Work.
14. Temporary Construction Protection.
15. Security.
16. Parking.
17. Vehicle Access.
18. Progress Cleaning and Waste Removal.
19. Field Offices and Sheds.
20. Removal of Utilities, Facilities, and Controls.

B. Related Sections include:

1. Section 01 10 00 - Summary of Work.
2. Section 01 61 00 - Common Product Requirements.
3. Section 01 77 00 - Closeout Procedures.
4. Division 26 - Electrical.

1.02 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. By Contractor

1. Contractor shall provide and pay for fuel-powered light plants or other light generating equipment for construction operations as required at all staging, assembly, and construction areas.
2. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

3. Maintain lighting and provide routine repairs.
4. Permanent building lighting may be utilized during construction. Replace lamps at final completion for all permanent fixtures.

1.03 TEMPORARY HEATING

A. By ContractorProvide and pay for heating devices and heat as needed to maintain specified conditions for construction operations.

B. Provide and pay for heating devices and heat as needed to maintain specified conditions for construction operations.

1. If required, provide separate metering or reimburse Owner for cost of energy used.
2. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
3. Maintain minimum ambient temperature of 50 degrees F in areas, unless indicated otherwise in product sections.
4. Exercise measures to minimize construction heating.

1.04 TEMPORARY PIPING AND PUMPING

A. General Contractor shall provide and maintain temporary pumps, piping, automatic controls, and related appurtenances to allow bypassing and continuous operation of facilities during construction where required.

B. Contractor shall submit to Engineer for approval a temporary pumping and piping plan for all bypassing activities required. Plan shall include methods, pump information, piping layouts, inlet and discharge locations, control system, and duration of bypassing operation.

C. All costs including power, installation, operation, maintenance, and removal shall be the Contractor’s responsibility.

D. All bypassing systems shall be properly sized for the application, with redundancy, to assure that there are no sewage spills or backups. Contractor shall provide means for preventing backups, spills, and surcharges during connection, disconnection, and operation of temporary bypassing systems. Contractor shall be responsible for all damages caused directly or indirectly by sewage backups, spills or surcharging related to inadequacy or failure of bypassing operations.

E. Bypassing operations should be scheduled and limited to the minimum time required to complete required construction activities.

F. In the event of an emergency, Contractor shall have on standby, a means to provide a temporary bypass to collect and dispose of sewage.

G. Standby power shall be provided for all bypass pumping systems.

1.05 TELEPHONE/EMAIL SERVICE

A. Provide, maintain, and pay for telephone and E-mail service to project superintendent from time of project mobilization to final completion.

1.06 TEMPORARY WATER SERVICE

A. Contractor shall verify location of temporary water supply on or near site and shall provide piping, hoses, meter, and fittings required to distribute it as required by the Work. Contractor shall supply approved backflow prevention and metering equipment.

B. Contractor shall not be charged for reasonable water use throughout the construction period. Contractor shall make all reasonable efforts to conserve water. Owner reserves the right to charge Contractor for water use deemed to be excessive.

C. Contractor shall not damage plumbing at source of temporary water.

D. Where water source is not available at or near site, Contractor shall make arrangements with Owner for source of water at appropriate hydrant locations. Contractor shall provide tanker truck, and metering equipment necessary to measure water from hydrant locations.

1.07 TEMPORARY SANITARY FACILITIES

A. Contractor shall provide and maintain required facilities and enclosures. Provide from time of project mobilization to final completion.

1.08 FIRST AID FACILITIES

A. First aid facilities shall be provided and maintained by the Contractor in accordance with all federal, state, and local laws and regulations.

1.09 FENCING

A. By Contractor:

1. Provide temporary fencing around open excavation areas.
2. Owner and Engineer shall be provided with any keys necessary to access the project site.

1.10 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide protection for plants designated to remain. Replace damaged plants.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.11 WATER CONTROL

A. By Contractor:

1. Grade site to drain.
2. Maintain excavations free of water.
3. Provide, operate, and maintain pumping equipment.
4. Protect site from puddling or running water.
5. Provide water barriers as required to protect site from soil erosion.

1.12 ENCLOSURES

A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with locks; Owner shall have access to site at all times.

B. Temperatures inside the enclosures and/or enclosed parts of structures shall be not less than 60 degrees F for 48 hours prior to and during time when concrete work, cement finishing, or masonry work are being completed or curing and not less than 50 degrees F when other trades are working.

1.13 TEMPORARY CONTROLS

A. Storm Water Permits

1. Contractor shall obtain all necessary permits from Watershed Districts or responsible regulatory agencies for temporary erosion control measures. Contractor shall obtain an NPDES storm water permit for construction disturbing more than one acre of area in conjunction with the Owner.
2. Contractor shall provide and maintain all best management practices necessary for erosion prevention, sediment control, dewatering and basin draining, and pollution prevention management measures at the Site in accordance with the requirements of the NPDES Storm Water permit and associated storm water pollution prevention plan (SWPPP) to be

submitted to the North Dakota Department of Environmental Quality (DEQ) following award of the contract and prior to beginning construction.

3. The following paragraphs outline general best management practices that will be included in the SWPPP submitted to the DEQ. The SWPPP and NPDES shall be located at the site at all times during the construction. Contractor shall meet the general requirements as outlined below and any additional requirements required as a part of the review and approval of the NPDES storm water permit and SWPPP.

B. Erosion Prevention Practices:

1. Per Section 01 57 13 - Temporary Erosion and Sediment Control.

C. Sediment Control Practices:

1. Per Section 01 57 13 - Temporary Erosion and Sediment Control.

D. Dewatering and Basin Drainage:

1. Grade site to drain and maintain excavations free of water.
2. Dewatering and basin draining must discharge to a temporary or permanent sedimentation basin.
3. Provide, maintain, and operate pumping equipment as required.
4. Prevent erosion and scour at dewatering or pumping locations, disperse over natural rock riprap, sand bags, plastic sheeting, or other accepted measures.
5. Provide water barriers as required to protect site from soil erosion.

E. Inspections and Maintenance of SWPPP:

1. Shall be conducted by Contractor.
2. Occur every seven days.
3. Occur within 24 hours of ½” storm.
4. Be routinely recorded and kept with the SWPPP.
5. Occur once a month on final stabilized area.
6. Ensure integrity and effectiveness of erosion prevention and sediment control measures.
7. Repair or replace nonfunctional best management practices or erosion control measures.
8. Drain and remove sediment from basins.
9. Inspect surface waters, drainage ditches and conveyance systems for sediment.
10. Remove sediment deposits and stabilize any exposed soil during sediment removal.
11. Inspect and clean vehicle exits.
12. Ensure infiltration areas are protected.

F. Pollution Prevention Management Measures:

1. Contractor shall provide proper collection and disposal of solid waste. All construction debris and solid waste shall be contained in dumpsters or roll off boxes. All dumpsters and roll off boxes shall be located behind erosion control devices and a minimum of 10 feet from any catch basin structure.
2. All construction material shall be stored in an orderly manner.
3. All chemicals on site shall be kept in sealed containers with their original labeling and Material Safety Data sheets available.
4. All appropriate agencies shall be notified of any spill of fuel, oil, or other hazardous chemicals immediately upon detection.
5. Establish a specific truck washing site.
6. There shall be no on site engine degreasing.

G. Dust Control:

1. Contractor shall be responsible for dust control throughout the duration of the Project.
2. Work shall be executed by methods to minimize raising dust from construction operations.
3. Provide appropriate dust control measures as required to prevent excessive dust from dispersing into the air.

H. Noise Control:

1. Contractor shall be responsible for noise control throughout the duration of the Project.
2. Avoid the use of tools and equipment which produce harmful noise.
3. Restrict the use of noise making tools and equipment to required hours of construction.

I. Road Cleaning:

1. As required, the Contractor shall sweep or clean all roads and streets that are affected by vehicle traffic entering or leaving the site.

1.14 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.

C. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

D. Prohibit traffic from landscaped areas.

E. Prohibit traffic outside of easement areas and construction limits.

1.15 TEMPORARY CONSTRUCTION PROTECTION

A. Shoring and Bracing:

1. Contractor shall provide and maintain temporary supports, shoring, and bracing as required for protection of work.
2. Contractor shall assure the adequacy of all temporary shoring and bracing.
3. Repair or replace damaged work occasioned by inadequate temporary supports, shoring, or bracing.
4. Leave temporary supports, shoring, and bracing in place until permanent construction is complete to point where installed work is properly supported.

1.16 SECURITY

A. Provide security and facilities to protect Work, and existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

B. Coordinate with Owner's security program.

C. Deliveries, Contractor shall inform

1. Engineer and Owner of all equipment deliveries at least 24 hours in advance of
2. Equipment/material arrivals scheduled for delivery to Owner occupied facilities.

D. Contractor to discuss security with his employees and sub-contractors and advise them to immediately report anything suspicious which could be a security issue.

1.17 PARKING

A. Contractor and personnel shall park all personal vehicles in an area acceptable to Owner and applicable property owners within all construction areas.

B. Do not block or hinder access to local property, driveways, or walkways.

1.18 VEHICLE ACCESS

A. By Contractor.

1. Maintain access roads leading into Site.
2. Provide means of removing mud from vehicle wheels before entering streets and roads.

3. Construct and maintain temporary roads accessing public roads to serve construction areas.
4. Provide aggregate materials as an incidental to the Contract is access roads are not suitable for truck and equipment traffic or to accommodate local rainfall events.
5. When finished using access road(s) remove temporary access roads and return surface to pre-existing or better condition, as an incidental to the project.

B. Traffic Control

1. **Contractor is required to develope a traffic control plan and submit as a shop drawing for review by the Engineer at least two (2) weeks prior to the start of construction.**
2. Contractor shall provide and maintain signs, warning lights, and barricades to adequately protect warn and protect the public from hazardous protrusions, materials, excavations, and equipment resulting directly or indirectly from construction activities.
3. All traffic control devices including signs, warning lights, and barricades shall conform to the requirements of the North Dakota Department of Transportation (ND DOT).
4. Traffic control setup and layout shall conform to requirements of the ND DOT and shall be the sole responsibility of the Contractor.
5. Contractor shall give Owner and Engineer at 48 hours' notice prior to a partial blockage or closure of any street or public right of way. When working in the right of way of county roads, Contractor shall be responsible for acquiring the necessary permits for working in a right-of-way.
6. Traffic control devices shall be inspected daily. Warning lights should be checked for proper operation and cleaned as required. All broken or ineffective traffic control devices shall be replaced immediately.
7. Contractor shall designate an individual and one alternate to have responsible charge of proper installation and maintenance of the traffic control devices. These individuals shall be available on a 24-hour on call basis.

1.19 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.

D. Contractor shall maintain site clean and free of obstructions that may cause injuries or otherwise prevent staff (Owner, Engineer, Contractors, etc.) from performing their job effectively.

1.20 FIELD OFFICES AND SHEDS

A. Construction Field Office (trailer or shed): At Contractor's option.

B. Locate Field Offices and construction trailer or shed a minimum distance of 30 feet from existing and new structures. Owner's approval of location is required.

1.21 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials, prior to Final Application for Payment inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.22 PROJECT IDENTIFICATION

A. Provide project sign as detailed in Supplemental General Conditions, if any. Erect on-site at location established by Engineer and Owner.

B. No other signs are allowed except those required by law.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

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SECTION 01 61 00
COMMON PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes:

1. Products.
2. Transportation and Handling.
3. Storage and Protection.
4. Product Options.
5. Substitutions.

B. Related Sections include, but are not limited to:

1. Section 00 21 13 – Instructions to Bidders.
2. Section 00 72 00 – General Conditions.
3. Section 00 73 00 – Supplementary Conditions.
4. Section 01 25 00 – Substitution Procedures.
5. Section 01 45 00 – Quality Control.

1.02 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the Work. Products may also include existing materials or components designated for re-use.

B. All products that may come into contact with water intended for use in a public water system shall meet American National Standards Institute (ANSI)/National Sanitation Foundation (NSF) International Standards 60 and 61, as appropriate. A product will be considered as meeting these standards if so certified by NSF, the Underwriters Laboratories, or other organization accredited by ANSI to test and certify each product.

C. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

D. Provide interchangeable components of the same manufacturer for components being replaced.

1.03 TRANSPORTATION AND HANDLING

A. Transport and handle Products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

A. Store and protect Products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to Product.

D. For exterior storage of fabricated Products, place on sloped supports above ground.

E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

F. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.

G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

J. Contractor shall be responsible to arrange for, receive, inspect, and unload all shipments of materials or equipment. Contractor shall provide haul route information to shipping companies.

1.05 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with an option for an “Or Equal” or “Approved Equivalent” or “Prior Approved Equivalent” Manufacturer: Submit a request for the “or equal/approved equivalent” in

accordance with the following substitutions article. Requests and Engineer's acceptance of "Or Equal" or "Approved Equal" or "Prior Approved Equivalent" Manufacturers is allowed during bidding only.

1.06 SUBSTITUTIONS

A. See Specification Section 01 25 00 Substitution Procedures.

B. "Or-Equal" or "Approved Equivalent" or "Acceptable" or "Prior Approved Equivalent" products will be considered **only** if written request is made at least **ten (10)** days prior to Bid opening.

C. Substitutions will be considered when a Product becomes unavailable through no fault of the Contractor.

D. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

PART 2 PRODUCTS

2.01 UNIFORMITY

A. For any type of similar equipment, i.e., motors, drive units, etc., provide equipment of the same manufacturer.

B. Inform all subcontractors and suppliers of the selected manufacturers to ensure equipment uniformity.

2.02 TOOLS

A. For any equipment or equipment components requiring special tools, the Contractor shall supply the Owner with such tools to allow for the maintenance and removal/replacement of equipment components.

2.03 CONSUMABLES

A. Provide Owner with all consumable items that are required during start-up and initial operation (ninety (90) days minimum) of all Project components.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install all equipment in full compliance with the manufacturer's recommendations.

B. Obtain services of qualified and approved factory representatives to install, check, and approve the installation of all equipment.

C. Service representative:

1. Present for the start-up and initial operation of all equipment.
2. Certify in writing that:
    a. Equipment is properly installed and ready for operation.
    b. Equipment properly aligned.
    c. Direction of rotation checked.
    d. Lubrication is proper.
    e. Unit is free from undue stress from connecting pipe or anchorage.
    f. Unit has operated at full load conditions.
    g. Unit has operated in full compliance with the project specifications and the manufacturer's recommendations.

END OF SECTION

SECTION 01 73 29
CUTTING AND PATCHING

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes:

1. Requirements and limitations for cutting and patching of Work.

B. Related Sections include:

1. Section 01 10 00 – Summary of Work.
2. Section 01 25 00 – Substitution Procedures.
3. Section 01 33 00 – Submittal Procedures.
4. Section 01 61 00 – Common Product Requirements.
5. Individual Product Specification Sections:
   a. Cutting and patching incidental to Work of this Section.
   b. Advance notification to other Sections of openings required in Work of those Sections.

1.02 SUBMITTALS

A. Submit written request in advance of cutting or alteration that affects:

1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate contractor(s).

B. Include in request:

1. Identification of Project.
2. Location and description of affected Work.
3. Necessity for cutting or alteration.
4. Description of proposed Work and Products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor(s).
7. Written permission of affected separate contractor(s).
8. Date and time when Work will be executed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Those required for original installation.

B. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 61 00 – Common Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing Work, assess conditions affecting performance of Work.

C. Understand and become familiar with required coating systems, application requirements, and spatial concerns, issues, and dimensions required to perform the Work.

D. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas that may be exposed by uncovering Work.

C. Maintain excavations free of water.

D. Verify that all materials are clean and free from defects.

3.03 CUTTING

A. Execute cutting and fitting to complete the Work.

B. Uncover work to install improperly sequenced Work.

C. Remove and replace defective or non-conforming Work.

D. Remove samples of installed Work for testing, when requested.

E. Employ original installer of new Work to perform cutting for weather exposed and moisture resistant elements, and sight-exposed surfaces. Employ experienced personnel or original supplier for applying specialized coating systems.

F. Cut rigid materials, masonry, prestressed concrete, and concrete using masonry saw or core drill. Pneumatic tools not allowed without prior approval. Protect finished water reservoirs from materials produced during saw cutting and core drilling.

3.04 PATCHING

A. Execute patching to complement adjacent Work.

B. Fit Products together to integrate with other Work.

C. Execute Work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

D. Employ original installer of new Work to perform patching for weather and moisture resistant elements, and sight-exposed surfaces.

E. Restore Work with new Products in accordance with requirements of Contract Documents.

F. Fit Work airtight and water tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

H. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

I. Identify any hazardous substance or condition exposed during the Work to the Engineer for decision or remedy.

3.05 ALTERATION PROJECT PROCEDURES

A. Materials: As specified in Product sections; match existing Products and Work for patching and extending Work.

B. Employ skilled and experienced installer to perform alteration Work.

C. Close openings in exterior surfaces to protect existing Work from weather and extremes of temperature and humidity.

D. Remove, cut, and patch Work in a manner to minimize damage and to provide means of restoring Products and finishes to original or specified condition.

E. Refinish existing visible surfaces to remain in renovated rooms and spaces, to renewed condition for each material, with a neat transition to adjacent finishes.

F. Where new Work abuts or aligns with existing, provide a smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

G. When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation to Engineer for review.

H. Where a change of plane of 1/4 inch or more occurs, submit recommendation for providing a smooth transition; to Engineer for review request instructions from Engineer.

I. Patch or replace portions of existing surfaces that are damaged, lifted, discolored, or showing other imperfections.

J. Finish surfaces as specified in individual Product Sections.

END OF SECTION

SECTION 01 75 00
STARTING AND ADJUSTING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Quality Assurance.
2. Scheduling.
3. Preparation.
4. Starting Systems.
5. Start-Up Period.
6. Adjusting.
7. Acceptance of Equipment and Systems.
8. Guarantee and/or Warranty Period.

B. Related Sections include:

1. Section 01 33 00 – Submittal Procedures.
2. Section 01 45 00 – Quality Control.
3. Section 01 61 00 – Common Product Requirements.
4. Section 01 77 00 – Closeout Procedures.
5. Section 01 78 23 – Operations and Maintenance Data.
6. Section 01 79 00 – Demonstration and Training.

1.02 QUALITY ASSURANCE

A. Provide authorized and qualified manufacturer's representative to inspect, check, and approve equipment installation prior to start-up and to assist with demonstration testing.

B. Authorized representative shall supervise placing equipment into operation.

C. Prior to demonstration to Owner and Engineer, provide written confirmation that systems have been tested, adjustments have been made, and equipment is ready for start-up demonstration.

D. Provide access to equipment and systems. Operate systems at designated times and under conditions required.

E. Contractor shall submit one (1) electronic copy of written start-up report for each system or equipment item following each start-up.

1.03 SCHEDULING

A. Contractor shall submit preliminary start-up and instruction schedule at least 15 calendar days prior to proposed dates. List times and dates for each system or equipment item. Include names of Contractor's and subcontractors personnel, manufacturer, and/or authorized representative proposed to perform services. Provide documentation to verify their qualifications.

B. Contractor shall coordinate scheduling of start-up. Scheduling of start-up shall be subject to approval of Owner and Engineer.

C. Contractor shall notify Owner and Engineer of changes in scheduling at least five (5) days in advance prior to scheduled start-up of individual systems or equipment. Scheduling changes shall be subject to approval by Owner and Engineer.

PART 2 PRODUCTS

2.01 NOT USED.

PART 3 EXECUTION

3.01 PREPARATION

A. Inspect equipment for cleanliness and remove or clean foreign matter.

B. Confirm that equipment is properly anchored and supported.

C. Inspect hand and automatic valves, clean bonnets and stems, tighten packing glands to ensure no leakage. Adjust valves as necessary for proper operation. Verify valve proper valve positioning for prior to start-up and testing of associated equipment.

3.02 STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Engineer and Owner seven (7) days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable manufacturer's representative in accordance with manufacturer’s instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report in accordance with Section 01 33 00 that equipment or system has been properly installed and is functioning correctly.

3.03 START-UP PERIOD

A. Following successful completion of demonstration testing per Section 01 79 00 – Demonstration and Training, the Contractor shall be responsible for the operation and control of new equipment and/or systems for a minimum period of 15 days.

B. Contractor shall be responsible for making any changes, repairs, or replacements during this 15 day operating period.

C. During the 15 day testing period, the Contractor shall provide supervisory personnel who fully understand the operation of the equipment. It is the intention that during this period, the Owner’s personnel will become familiar with the operation and maintenance of the equipment or system.

D. All costs associated with operating and maintaining the installed equipment and/or systems, including power and fuel costs shall be the responsibility of the Contractor.

3.04 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

3.05 ACCEPTANCE OF EQUIPMENT AND SYSTEMS

A. Upon completion of training specified in Section 01 79 00 – Demonstration and Training, receipt of the final operation and maintenance manuals per Section 01 78 23 – Operations and Maintenance Data, receipt of the required start-up and demonstration testing reports, and following successful completion of the 15 day operating period, ENGINEER shall promptly review submittals of the manuals and reports.

B. Contractor shall provide additional information or tests if required by the Engineer.

C. Following review of the information, Engineer shall recommend approval of the equipment and acceptance of the installation to the Owner. The Owner shall

provide in writing notice of acceptance of the equipment within a reasonable time after receipt of Engineer's recommendation.

D. Equipment placed into temporary operation prior to final completion of the project shall be readjusted and/or calibrated as required prior to final completion of the project.

E. After equipment has been tested, adjusted, and accepted in writing by the Owner, but before final acceptance of the entire project, the Owner will assume operation and maintenance responsibilities for the equipment or systems, including power and fuel costs. The Owner may place portions of the facility into operation prior to final acceptance of the entire project.

3.06 GUARANTEE AND/OR WARRANTY PERIOD

A. The guarantee or warranty period for all equipment and/or systems will start from the date of written notice of final acceptance of the equipment and/or systems by the Owner.

B. There will be no exceptions to the start of the guarantee or warranty period.

END OF SECTION

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Closeout Procedures.
2. Substantial Completion.
3. Final Completion.
4. Final Cleaning.
5. Project Record Documents.
6. Spare parts and Maintenance Products.
7. Warranties and Bonds.
8. Maintenance Service.
9. Final Adjustment of Accounts.

B. Related Sections include:

1. Section 00 72 00 – General Conditions.
2. Section 00 73 00 – Supplementary Conditions.
3. Section 01 31 13 – Project Coordination.
4. Section 01 50 00 – Temporary Facilities and Controls.
5. Section 01 61 00 – Common Product Requirements.
6. Section 01 75 00 – Starting and Adjusting.
7. Section 01 78 23 – Operation and Maintenance Data.

1.02 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.

B. Provide submittals to Engineer that are required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

D. Owner will occupy all portions of the Project.

1.03 SUBSTANTIAL COMPLETION

A. Prior to substantial completion Contractor shall review Contract Documents for items which are not complete or need to yet be completed including submittal of

all manuals, and testing reports. Contractor shall make a list of incomplete work, a value of the incomplete work, and reasons why work is incomplete. Contractor shall complete all items required to be completed as part of substantial completion.

B. Substantial Completion is defined as the time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of the 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 of delivering potable water to Owner's customers. In addition, to achieve Substantial Completion of the Work for distribution and transmission pipelines and all associated appurtenances required for a complete and operable installation located in agricultural fields, completed Work shall include top soil replacement, spreading, and cultivation of disturbed field areas to allow full and unhindered use by property owners as agricultural land for seed bed purposes in the spring of the immediately following spring planting season. The terms "substantially complete" and "substantially completed" as applied to all or a part of the Work refer to Substantial Completion thereof.

C. Contractor shall provide a written notice to Engineer that the work, or specific portions of the work, is substantially complete and ready for review. If there are any items remaining to be corrected or completed Contractor shall submit a list of these items along with the notice of substantial completion. Along with the list of items the Contractor should provide a written explanation of why these items are not considered necessary for substantial completion.

D. Upon receipt of Contractor's notice of substantial completion, Engineer will proceed with inspection for substantial completion.

E. Following the substantial completion inspection by the Engineer and Engineer's subconsultants, Engineer will either prepare certificate of substantial completion, or notify the Contractor in writing that substantial completion has not been meant listing the various reasons.

F. Contractor shall promptly complete the items required to meet substantial completion and submit a second notice of substantial completion to the Engineer.

G. Engineer will review the work a second time do determine the status of substantial completion.

H. When Engineer considers the project to be substantially complete, Engineer will prepare the preliminary certificate of substantial completion along with a substantial completion punch list of items to be completed prior to final payment. Engineer will deliver preliminary certificate and punch list to Owner and consider any objections by the Owner as provided in the Conditions of the Contract.

I. Upon agreement by Owner and Engineer of substantial completion and punch list items, Engineer will execute and deliver to the Contractor and Owner a final certificate of substantial completion along with substantial completion punch list of items to be completed prior to final payment.

J. A maximum of two (2) reviews of substantially complete work will be completed by Engineer and Engineer's subconsultants for any one portion of work under the Contract. Should a third or subsequent reviews be necessary the following requirements will be met:

1. Owner will compensate Engineer for additional reviews.
2. Owner will deduct the amount of compensation paid to the Engineer for additional reviews from the payment to the Contractor.
3. Compensation shall be at Engineer's standard hourly rates plus actual cost of reimbursables.

1.04 FINAL COMPLETION

A. Following substantial completion Contractor shall complete remaining work and items to be corrected as part of substantial completion punch list as well as final cleaning and transferring site to Owner.

B. When Contractor considers that all work is complete, Contractor shall provide written notice of final completion to Engineer.

C. Following receipt of final completion certification, Engineer and Engineer's subconsultants shall review the work to verity that the requirements for final completion have been met.

D. Upon review of work for final completion Engineer will either request the Contractor to make closeout submittals or will notify Contractor that the work is not complete with a list of incomplete or defective work. Contractor shall promptly take steps to correct all listed deficiencies and incomplete work before sending a second written notice of final completion certification to Engineer.

E. If final completion was not met following first review, Engineer will review work a second time to determine if the requirements for final completion have been met.

F. A maximum of two (2) reviews of final complete work will be completed by Engineer and Engineer's subconsultants for any one portion of work under the Contract. Should a third or subsequent reviews be necessary the following requirements will be met:

1. Owner will compensate Engineer for additional reviews.
2. Owner will deduct the amount of compensation paid to the Engineer for additional reviews from the payment to the Contractor.

3. Compensation shall be at Engineer’s standard hourly rates plus actual cost of reimbursables.

G. When Engineer considers all work to be complete in accordance with the Contract Documents, Engineer shall request the Contractor to make closeout submittals.

1.05 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

C. Replace filters of operating equipment.

D. Clean site; sweep paved areas, rake clean landscaped surfaces.

E. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.06 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling current and future reference by Owner and Engineer.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to finish first floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

G. Submit documents to Engineer with claim for final Application for Payment.

1.07 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra Products in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

1.08 WARRANTIES AND BONDS

A. Provide duplicate notarized copies.

B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in D size three ring binders with durable plastic cover.

D. Submit prior to final Application for Payment.

E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance.

1.09 MAINTENANCE SERVICE

A. Furnish service and maintenance of components during the warranty period.

B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

D. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

1.10 FINAL ADJUSTMENT OF ACCOUNTS

A. Contractor shall submit a final statement of accounting to Engineer. Statement shall reflect all adjustments to the contract sum and include the following:

1. Original contract sum.
2. Additions and deductions resulting from:
   a. All previous change orders
   b. Allowances
   c. Unit prices
   d. Deductions for uncorrected work
   e. Penalties and bonuses
   f. Deductions for liquidated damages
   g. Deductions for multiple reviews
   h. Other adjustments
3. Total contract sum as adjusted.
4. Previous payments.
5. Sum remaining due.

B. Engineer will prepare a final change order, reflecting approved adjustments to the contract sum which were not previously made by change orders.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Quality Assurance.
2. Format.
3. Contents of Each Volume.
4. Manual for Equipment and Systems.
5. Instruction of Owner's personnel.
6. Submittals.
7. Schedule of Submittals.

B. Related Sections include:

1. Section 00 72 00 – General Conditions.
2. Section 00 73 00 – Supplementary Conditions.
3. Section 01 33 00 – Submittal Procedures.
4. Section 01 45 00 – Quality Control.
5. Section 01 61 00 – Common Product Requirements.
6. Section 01 77 00 – Closeout Procedures.

1.02 QUALITY ASSURANCE

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.03 FORMAT

A. Prepare data in the form of an instructional manual. Arrange data in numerical format.

1. Binders:
   a. Commercial quality, 8-1/2 x 11 inch three D side ring binders with durable plastic covers.
   b. 2 inch maximum ring size.
   c. When multiple binders are used, correlate data into related consistent groupings.
2. Cover; Identify:
   a. Each binder with typed title OPERATION AND MAINTENANCE INSTRUCTIONS.
   b. Title of Project.
   c. Subject matter of contents.
   d. Volume number.

e. Year of construction.

3. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

B. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

C. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages. Folded paper should be unfoldable without removal from binder.

D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
   a. Significant design criteria.
   b. List of equipment.
   c. Parts list for each component.
   d. Operating instructions.
   e. Maintenance instructions for equipment and systems.
3. Part 3: Project documents and certificates, including the following:
   a. Shop drawings and product data.
   b. Certificates.
   c. Photocopies of warranties.
   d. Bonds.

E. Flash Drive:

1. A flash drive shall be provided with all documents included with an index, tabs, and labels as previously required for the binders.

1.04 CONTENTS OF EACH VOLUME

A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Engineer, Subconsultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

E. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

F. Warranties: Prepare and submit per Section 01 77 00 – Closeout Procedures.

G. Bonds: Prepare and submit per Section 01 77 00 – Closeout Procedures.

H. Flash Drive: A flash drive shall be provided with all volume contents in electronic format or scanned to a portable document file (.pdf). The documents shall be placed as required under the appropriate tabs and labels as previously required for the compact discs. Each file shall be adequately labeled to identify the contents without opening the document.

1.05 INSTRUCTION OF OWNER PERSONNEL

A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.

B. For equipment requiring seasonal operation, perform instructions for other seasons within six (6) months.

C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

1.06 SUBMITTALS

A. Submit electronic copies of preliminary draft or proposed formats and outlines of contents before Substantial Completion. Engineer will review draft and return one copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

C. Submit electronic copies of completed volumes fifteen (15) working days prior to final inspection. One (1) copy will be returned after final inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.

D. Submit two (2) sets of revised final volumes in final form within ten (10) days after final inspection.

E. Submit a minimum of two (2) complete copies of the flash drives with final documents in electronic format within then (10) days after final inspection.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Quality Assurance.
2. Scheduling.
3. Demonstration Testing.
4. Equipment Training.

B. Related Sections include:

1. Section 01 45 00 – Quality Control.
2. Section 01 61 00 – Common Product Requirements.
3. Section 01 75 00 – Starting and Adjusting.
4. Section 01 77 00 – Closeout Procedures.
5. Section 01 78 23 – Operation and Maintenance Data.

1.02 QUALITY ASSURANCE

A. Provide authorized and qualified manufacturer's representative to inspect, check, and approve equipment installation prior to start-up and to assist with demonstration testing.

B. Authorized representative shall supervise placing equipment into operation.

C. Prior to demonstration to Owner and Engineer, provide written confirmation that systems have been tested, adjustments have been made, and equipment is ready for start-up demonstration.

D. Provide access to equipment and systems. Operate systems at designated times and under conditions required.

E. Contractor shall submit two (2) copies of written demonstration testing report following completion of demonstration testing for each equipment item. Report shall describe the test, test conditions, and result.

1.03 SCHEDULING

A. Contractor shall submit two (2) copies of demonstration testing and instruction schedule at least 15 calendar days prior to proposed dates. List times and dates for each system or equipment item. Include names of Contractor's and subcontractors personnel, manufacturer, and/or authorized representative

proposed to perform services. Provide documentation to verify their qualifications.

B. Contractor shall coordinate scheduling of start-up, demonstration testing, and instruction of Owner's personnel by manufacturer’s representatives. Scheduling of start-up, demonstration testing, and instructional activities shall be subject of approval of Owner and Engineer.

C. Contractor shall notify Owner and Engineer of changes in scheduling at least five (5) days in advance prior to demonstration testing or instructional services for an individual systems or equipment. Scheduling changes shall be subject to approval by Owner and Engineer.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.01 DEMONSTRATION TESTING

A. Upon completion of inspection, adjusting, and balancing per Section 01 75 00 – Starting and Adjusting; demonstrate that each separate piece of equipment of each system and related mechanical or instrumentation and control equipment operate in accordance with the requirements of the Contract Documents. Where no performance requirements are specified, demonstrate the equipment operates in accordance with the manufacturer’s requirements and industry standards for the specific application.

B. Demonstration tests shall confirm smooth operation, without excessive noise or vibration; equipment is responsive to manual and automatic controls; control and protective devices are properly set; and equipment will run on controlled or intermittent basis.

C. Demonstrate all alarm and safety lockout systems for correct functioning with instrumentation and control. Each remote control point and alarm point shall be tested.

D. In the event of demonstration test failure, the equipment shall be adjusted, repaired, or replaced subject to approval of the Engineer. Following adjustment, repairs, or replacement the equipment shall be demonstration tested again. All costs for adjustment, repairs, or replacement shall be the responsibility of the Contractor.

E. All costs associated with the demonstration testing, including power and fuel costs shall be the responsibility of the Contractor.

3.02 EQUIPMENT TRAINING

A. The Contractor shall provide competent personnel who fully understand the operation of the equipment and who are authorized by the manufacturer to instruct the Owner on the operation and maintenance of each equipment item and/or system.

B. Instruction and training shall take place following initial start-up, balancing, and testing of equipment or system. The instruction and training may take place prior to demonstration testing or during the 15 day operation period, but shall take place prior to acceptance of the installation by the Owner.

C. Training shall be of the on-the-job type, and shall cover all areas of control, operation, and maintenance.

D. For equipment or systems requiring seasonal operation, perform demonstration for other season within six (6) months.

E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

F. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

G. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

H. The amount of time required for instruction on each item of equipment and system is not less than that specified in individual sections.

I. Taping of Training Sessions:

1. The Owner reserves the right to use any types of audio/visual recording devices during start-up and training activities.

END OF SECTION

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SECTION 01 79 50
FINAL INSPECTION AND ACCEPTANCE

Contractor:_____

Address:_____

Project: Williston Water Resource Recovery Facility (WRRF) Reuse Project
City of Williston
Williston, ND

Contract:_____

On this date, _____,_____, a final inspection of the project as constructed has been made.

The Contractor hereby certifies that the construction has been performed in accordance with the plans and specifications, approved Change Orders, and terms of the contract. The Contractor further certifies that there are no unpaid bills or labor disputes in connection with this contract and that the amount of $_____ shown on the final estimate is the total amount due for all Work completed for the project.

The Owner does hereby agree that all construction and engineering Work on the project is complete and does satisfy all terms of appropriate construction or engineering agreements.

The Project Engineer has observed the construction and to the best of his or her knowledge the construction has been performed in accordance with the plans, specifications, approved change orders, and terms of the contract and that the facility has been inspected and approved by all agencies having jurisdiction.

Owner and Contractor do hereby acknowledge that the one year correction period will begin on _____,.

The undersigned give approval of acceptance of the Work construction under the conditions and guarantee of the contract.

AE2S	City of Williston
Project Engineer	Owner
By:_____	By:_____
Date:_____	Date:_____

_____
Contractor

By:_____

Date:_____

END OF SECTION

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DIVISION 03
CONCRETE

SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.

B. Openings for other work.

C. Form accessories.

D. Form stripping.

1.02 RELATED REQUIREMENTS

A. Section 03 20 00 - Concrete Reinforcing.

B. Section 03 30 00 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

A. ACI CODE-318 - Building Code for Structural Concrete—Code Requirements and Commentary; 2025.

B. ACI PRC-347 - Guide to Formwork for Concrete; 2014 (Reapproved 2021).

C. ACI SPEC-117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).

D. ACI SPEC-301 - Specifications for Concrete Construction; 2020.

E. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures: American Concrete Institute

F. PS 1 - Structural Plywood; 2019.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on void form materials and installation requirements.

1.05 QUALITY ASSURANCE

A. Designer Qualifications: Design formwork under direct supervision of a Professional Structural Engineer experienced in design of concrete formwork and licensed in the State in which the Project is located.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver prefabricated forms and installation instructions in manufacturer's packaging.

B. Store prefabricated forms off ground in ventilated and protected manner to prevent deterioration from moisture.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.

C. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

D. Comply with relevant portions of ACI CODE-318, ACI PRC-347, and ACI SPEC-301.

E. Formwork Design and Construction: Comply with guidelines of ACI 347 to provide formwork that will produce concrete complying with tolerances of ACI 117.

F. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

2.02 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor.

B. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.

2.03 REMOVABLE PREFABRICATED FORMS

A. Preformed Steel Forms: Minimum 16 gauge, 0.0598 inch (1.52 mm) thick, matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

B. Preformed Plastic Forms: Thermoplastic form liner, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

C. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

D. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 6 inches (152 mm) thick unless noted otherwise on drawings.

2.04 FORMWORK ACCESSORIES

A. Form Ties: Removable or Snap-Off, fixed length, cone type, with waterproofing washer, 1-1/2 inch back break dimension, free of defects that could leave holes larger than 1-1/4 inch in concrete surface.

B. Form Release Agent: Capable of releasing forms from hardened concrete withoudst staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.

1. Composition: Colorless reactive or vegetable-oil based compound.
2. Do not use materials containing diesel oil or petroleum-based compounds.
3. VOC Content: In compliance with applicable local, State, and federal regulations.
4. Product must meet NSF requirements.
5. Products:
   a. SpecChem, LLC; Bio Strip WB (water-based): www.specchemllc.com/#sle.
   b. BASF Corporation: MasterFinish Series.
   c. Substitutions: See Section 01 60 00 - Common Product Requirements.

C. Filler Strips for Chamfered Corners: Rigid plastic or Wood type; 3/4 inch (19 mm) size; maximum possible lengths.

D. Flashing Reglets: Galvanized steel, at least 22 gage, 0.0299 inch (0.76 mm) thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.

E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

F. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 12 00.

G. Waterstops: As specified in Section 03 30 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

A. Earth forms are not permitted without specific approval from the Engineer.

3.03 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI SPEC-301.

B. The forms shall be constructed, shored, braced and tied to maintain their position and shape during and after placing concrete. The forms shall have adequate stiffeners, wales and braces to prevent noticeable deflection or waviness. Forms shall be sufficiently rigid to limit deflection under the weight of wet concrete to 1/8 inch.

C. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

D. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

E. Align joints and make watertight to prevent leakage of mortar. Keep form joints to a minimum.

F. Obtain approval before framing openings in structural members that are not indicated on drawings.

G. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

H. Coordinate this section with other sections of work that require attachment of components to formwork.

3.04 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces will receive special finishes that are affected by agent.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.

B. Locate and set in place items that will be cast directly into concrete.

C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

D. Position recessed anchor slots for brick veneer masonry anchors and precast veneer anchors to spacing and intervals specified in other sections.

E. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI SPEC-117, unless otherwise indicated.

3.08 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 00 - Quality Control.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.09 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

1. Forms must be left in place for a minimum of 18 hours after concrete placement.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Concrete shall not display any evidence of damage or excessive deflection due to form removal or loss of temporary support.

D. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

E. Shoring and/or forms shall be left in place as necessary to carry any construction equipment or materials that are placed during construction.

END OF SECTION

SECTION 03 20 00
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

C. Concrete anchors where otherwise not specified.

1.02 REFERENCE STANDARDS

A. ACI SP-66 - ACI Detailing Manual; 2004.

B. ACI SPEC-301 - Specifications for Concrete Construction; 2020.

C. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.

D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2026.

E. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2022a.

F. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars; 2018, with Amendment (2020).

G. CRSI (DA4) - Manual of Standard Practice; 2018, with Errata (2019).

H. CRSI (P1) - Placing Reinforcing Bars, 10th Edition; 2019.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

1. Prior to submitting reinforcing shop drawings, submit all construction joint locations to Engineer for approval as specified in Section 03 30 00 - Cast-in-Place Concrete.

C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.04 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI SPEC-301.

B. Provide Architect with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa).

1. Deformed billet-steel bars.
2. Unfinished.

B. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch (1.29 mm).
2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
3. Provide stainless steel or plastic components for placement within 2 inches (50 mm) of weathering surfaces.

C. Rebar Dowel Achorage: Post installed epoxy and acrylic systems.Submit proposed system for each specific use.

1. Submit proposed system for each specific use.

2.02 RE-BAR SPLICING:

A. Coupler Systems: Mechanical devices for splicing reinforcing bars; capable of developing full steel reinforcing design strength in tension and compression.

1. To be used at locations shown on Drawings; or as proposed by Contractor for specific locations.
2. Products:
   a. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
   b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Dowel Bar Splicer with Dowel-Ins: Mechanical devices for connecting dowels; capable of developing full steel reinforcing design strength in tension and compression.

1. To be used at locations shown on Drawings; or as proposed by Contractor for specific locations.

2.03 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice and ACI 318.

B. Welding of reinforcement is permitted only with the specific approval of Architect. Perform welding in accordance with AWS D1.4.

C. Locate reinforcing splices not indicated on drawings at point of minimum stress.

1. Submit and review locations of splices with Architect.

PART 3 EXECUTION

3.01 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

C. Do not displace or damage vapor barrier.

D. Accommodate placement of formed openings.

E. Maintain concrete cover as indicated on drawings.

F. Conform to applicable code, contract drawings and General Stuctural Notes for concrete cover over reinforcement.

G. Reinforcement shall not be cut unless shown on Structural drawings or by Engineer approval. Cut reinforcement shall be spliced with the following:

1. Coupler system as shown above.
2. Lap splice to meet Class B requirements.
3. Engineer approved alternate method.

H. All slab reinforcing must be on chairs. Hand lifting without supports during pour is prohibited.

I. All dowels between concrete elements must be tied in place prior to pour. Wet sticking dowels during pour is prohibited.

J. Reinforcement shall be free of foreign particles or coatings including form oils. Replace reinforcement that cannot be cleaned.

K. Upon completion of placement of reinforcing, notify Engineer and allow 24 hours for review prior to commencement of concrete placement.

L. Bond and ground all reinforcement to requirements of Section 26 05 26.

3.02 ANCHOR BOLTS AND EMBEDDED PARTS

A. Anchor bolts and anchor bolt groups shall be supported and set using templates attached to the forms, and embedded ends securely tied to prevent displacement during placing of concrete.

B. Tolerances from dimensions shown on the Drawing shall be in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges", AISC 303-05.

C. Unless shown otherwise, anchor bolts shall be set perpendicular to the theoretical bearing surface. Welding to anchor bolts will not be permitted. Exposed anchor bolt threads shall be given a coat of grease and protected from corrosion or other damage to the threads.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02

A. Joint devices associated with concrete work.

B. Concrete curing.

1.03 RELATED REQUIREMENTS

A. Section 03 10 00 - Concrete Forming and Accessories: Forms and accessories for formwork.

B. Section 03 20 00 - Concrete Reinforcing.

C. Section 03 35 11 - Concrete Floor Finishes: Densifiers, hardeners, applied coatings, and polishing.

D. Section 03 96 90 - Water Tightness Test of Hydraulic Structures.

E. All other specification sections defining items passing through or cast into concrete.

1.04 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

B. ACI 301 - Specifications for Structural Concrete

C. ACI PRC-211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide; 2022.

D. ACI PRC-302.1 - Guide to Concrete Floor and Slab Construction; 2015.

E. ACI PRC-304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).

F. ACI SPEC-301 - Specifications for Concrete Construction; 2020.

G. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

H. ACI 305.1 - Specification for Hot Weather Concreting.

I. ACI 306.1 - Standard Specification for Cold Weather Concreting.

J. ACI 308.1 - Specification for Curing Concrete.

K. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.

L. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures and Commentary.

M. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2024a.

N. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2024.

O. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2026.

P. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens); 2021.

Q. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

R. ASTM C150/C150M - Standard Specification for Portland Cement; 2024.

S. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2020.

T. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2026.

U. ASTM C231/231M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

V. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2024.

W. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2025.

X. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2024.

Y. ASTM C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes; 2018.

Z. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2025a.

AA. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2021.

BB. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.

CC. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete; 2019.

DD. ASTM C1567 - Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).

EE. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting; 2015.

FF. ASTM E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers (Metric); 2014.

GG. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.

HH. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs; 2017.

II. COE CRD-C 48 - Handbook for Concrete and Cement Standard Test Method for Water Permeability of Concrete; 1992.

JJ. COE CRD-C 572 - Handbook for Concrete and Cement Corps of Engineers Specifications for Polyvinylchloride Waterstop; 1974.

KK. Portland Cement Association (PCA).

LL. PCA - Design and Control of Concrete Mixtures.

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.

C. Mix Design: Submit proposed concrete mix design.The mix design shall be specific to this project and conditions of placement. with a written request for acceptance. The data submitted shall include:

1. Indicate proposed mix design complies with requirements of ACI SPEC-301, Section 4 - Concrete Mixtures.

2. Indicate proposed mix design complies with requirements of ACI 318-Chapter 19 and Chapter 26
3. Indicate proposed mix design complies with requirements of ACI 350, Chapter 4 and Chapter 5
4. Fine and coarse aggregate gradations per ASTM C33.
5. Method of determining the mix design proportions.
6. Water to cementitious material ratio.
7. Air content and unit weight.
8. Compressive strength at 7 and 28 days per ASTM C 39.
9. The proportions and types of all materials including admixtures.
10. The Shale and deleterious contents of all aggregates used.
11. Sulfate-resistant cement test results per ASTM C 1012.
12. Aggregate Alkali-Silica Reactivity test results per ASTM C 1567.
13. Shrinkage (length change) test results per ASTM C 157.

D. Submit proposed construction joint locations for all buildings to Engineer for approval.

1. Provide with numbering and sequencing.
2. Submit proposed locations prior to submitting concrete reinforcing submittals.

E. Samples: Submit two, 12 inch (305 mm) long samples of waterstops and construction joint devices.

F. Test Reports: Submit report for each test or series of tests specified.

G. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.

H. Submit hot weather concreting procedures for concreted installed and/or cured during temperatures described in ACI 305.1. These procedures shall be in conformance with ACI 305.1.

I. Submit cold weather concreting procedures for concrete installed and/or cured during temperatures described in ACI 306.1. Submittal shall include specific procedures in accordance with ACI 306.1 for all of the following but not limited to:

1. Provide methods for placing concrete to ensure no damage from cold weather effects
2. Provide methods for protecting concrete from cold weather and timing of addition/removal of said thermal protection.
3. Provide methods for protecting concrete from cold weather and timing of addition/removal of said thermal protection.
4. Provide curing methods used to ensure proper design strength of concrete is met while following proper thermal protection procedures.

5. Provide methods for ensuring concrete does not become damaged due to thermal shock upon removal of forms and/or thermal protection

J. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.06 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301, ACI 318, and ACI 350

B. Follow requirements of ACI 305.1 when concreting during hot weather.

C. Follow requirements of ACI 306.1 when concreting during cold weather.

D. Schedule pre-pour meeting/conference with Engineer, concrete supplier, independent testing agency, and all sub-contractors at least one week prior first concrete pour.

1. Additionally pre-pour conferences shall be held with Engineer at least one week prior to concrete pours greater than 150 cubic yards.

PART 2 PRODUCTS

2.01 FORMWORK

A. Comply with requirements of Section 03 10 00 - Concrete Forming and Accessories.

2.02 REINFORCEMENT MATERIALS

A. Comply with requirements of Section 03 20 00 - Concrete Reinforcing.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type II - Moderate Portland type.

1. Acquire all cement for entire project from same source or resubmit mill certificates if a different source is required.

B. Fine and Coarse Aggregates: ASTM C33/C33M.

1. Acquire all aggregates for entire project from same source or resubmit aggregate data if a different source is required.
2. Shale or deleterious content shall be no more than 0.5 percent for slabs and water bearing structures and 1 percent for all other concrete.

C. Fly Ash: ASTM C618, Class C or F.

D. Water: Per ASTM C1602 and "potable".

2.04 ADMIXTURES

A. Do not use chemical admixtures that contain intentionally-added chlorides.

B. Air Entrainment Admixture: ASTM C260/C260M.

C. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

D. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

E. Accelerating Admixture: ASTM C494/C494M Type C.

F. Retarding Admixture: ASTM C494/C494M Type B.

G. Water Reducing Admixture: ASTM C494/C494M Type A.

H. Shrinkage Reducing Admixture: ASTM C494/C494M Type S.

I. Crystalline Waterproofing Admixture: Concrete waterproofing system shall be of the crystalline type that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete.

1. Products:
   a. Xypex Chemical Corporation: Xypex Admix C-500
   b. Substitutions: See Section 01 60 00 - Product Requirements.
2. Shall be added at the time of batch and to meet manufacturers required dosage rates and mixing requirements.
3. Potable Water Contact Approval: NSF certification for use on structures holding potable water, based on testing in accordance with NSF 61.

2.05 ACCESSORY MATERIALS

A. Underslab Vapor Retarder:

1. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.
2. Products:
   a. ISI Building Products; Viper VaporCheck II 15-mil (Class A): www.isibp.com/#sle.
   b. Stego Industries, LLC; Class A - 15 mils: www.stegoindustries.com.
   c. W. R. Meadows, Inc; PERMINATOR Class A - 10 mils (0.25 mm): www.wrmeadows.com/#sle.
   d. Substitutions: See Section 01 61 00 - Common Product Requirements.

B. Controlled Low Strength Material (CLSM): Shall be a mixture of cement, Pozzolan, coarse and fine aggregate, admixtures, and water; mixed in accordance with ASTM C94 - Ready Mixed Concrete.

1. Minimum Compressive Strength at 28 days:
   a. Normal CLSM for pipeline shall be 100 psi.
   b. Structural backfill or bearing CLSM shall be 750 psi.
2. Composition: As determined by the ready mix supplier to achieve the minimum strength required.
3. Total Air Content: 4 - 7 percent.
4. Maximum Slump: 9 inches.

2.06 BONDING AND JOINTING PRODUCTS

A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.

1. Products:
   a. Euclid Chemical Company; AKKRO-7T: www.euclidchemical.com
   b. Kaufman Products Inc; SureBond: www.kaufmanproducts.net
   c. SpecChem, LLC; Strong Bond Acrylic Bonder: www.specchemllc.com
   d. W. R. Meadows, Inc; ACRY-LOK-: www.wrmeadows.com
   e. Substitutions: See Section 01 61 00 - Common Product Requirements.

B. Waterstops: PVC, complying with COE CRD-C 572.

1. Configuration: As indicated on drawings.
2. Type: Ribbed with center bulb.
3. Placement:
   a. Waterstop shall be continuous throughout the length of the joint and shall have equal embedment on both sides of the joint.
   b. Waterstops shall be clean, free from coatings, and shall be maintained in proper position prior to concrete placement until concrete has been deposited and compacted.
   c. All splices in waterstop shall be fully heat welded.
      1) Provide factory made waterstop fabrications for all changes of direction, intersections, and transitions leaving only straight butt joint splices for the field.
   d. Provide factory hog rings or grommets spaced at 12" o.c. to hold waterstop firmly in place.
4. Store waterstops under tarps to protect from oil, dirt, and sunlight.
5. Acceptable Products:
   a. Profile 732 by Greenstreak unless noted otherwise.
      1) Provide profile 702 by Greenstreak where noted as 4 inch waterstop.

b. Substitutions: See Section 01 61 00 - Common Product Requirements.

C. Retrofit Waterstops: PVC, complying with COE CRD-C 572.

1. Configuration: As indicated on the drawings.
2. Type: Ribbed with configuration required for specific application.
3. All splices in waterstop shall be fully heat welded.
   a. Provide factory made waterstop fabrications for all changes of direction, intersections, and transitions leaving only straight butt joint splices for the field.
4. Provide epoxy gel, stainless steel fasteners, and stainless steel batten bars as required for installation.
5. Store waterstops under tarps to protect from oil, dirt, and sunlight.
6. Acceptable Products:
   a. At concrete thickness less than 12": Profile 581 by Greenstreak.
   b. At concrete thickness 12" or greater: Profile 609 by Greenstreak.
   c. Substitutions: See Section 01 61 00 - Common Product Requirements.

D. Hydrophilic Rubber Waterstop:

1. Minimum cross sectional dimensions shall be 3/16-inch by 3/4-inch.
2. Configuration: As indicated on the drawings.
3. Acceptable Products:
   a. Hydrotite by Greenstreak.
   b. Substitutions: See Section 01 61 00 - Common Product Requirements
4. Acceptable at locations shown on drawings or approved by Engineer.

E. Hydrophilic Sealant:

1. Hydrophilic sealant shall adhere firmly to concrete, metal, and PVC in dry or damp condition. When cured sealant shall be elastic indefinitely.
2. Acceptable Products:
   a. Leakmaster LV-1 by Greenstreak.
   b. Substitutions: See Section 01 61 00 - Common Product Requirements.

F. Slab Isolation Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.

1. Material: ASTM D1751, cellulose fiber.
2. Products:
   a. W. R. Meadows, Inc; Fiber Expansion Joint Filler with Snap-Cap: www.wrmeadows.com/#sle.
   b. Substitutions: See Section 01 61 00 - Common Product Requirements.

2.07 CURING MATERIALS

A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.

1. Products must meet NSF requirements when indicated in mix design.
2. Products:
   a. SpecChem, LLC; SpecFilm Concentrate or SpecFilm: www.specchemllc.com/#sle.
   b. Master Builders Solutions US LLC; MasterKure ER 50: www.master-builders-solutions.com
   c. W. R. Meadows, Inc ; Evapre or Evapre-RTU: www.wrmeadows.com/#sle.
   d. Substitutions: See Section 01 61 00 - Common Product Requirements.

B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.

1. Products must meet NSF requirements when indicated in mix design..
2. Products:
   a. SpecChem, LLC; E-Cure: www.specchemllc.com.
   b. Substitutions: See Section 01 61 00 - Common Product Requirements.

C. Coordinate all curing materials with coatings and floor finishing. Use water curing for all applications unless approved by the Engineer.

D. Moisture-Retaining Sheet: ASTM C171.

1. Curing paper, regular.
2. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard (1.71 kg/sq m).

E. Polyethylene Film: ASTM D2103, 4 mil, 0.004 inch (0.102 mm) thick, clear.

F. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301.

1. For both methods, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

C. Admixtures: Add acceptable admixtures as recommended in ACI PRC-211.1 and at rates recommended or required by manufacturer.

D. Alkali-Aggregate Reactivity Resistance: Provide one of the following:

1. Total equivalent alkali content of mixture less than 5 lbs/ cu. yard.
2. ASTM C1567: Expansion less than 0.1% after 14 days with each of the aggregates (coarse and fine) and the supplementary cementing materials of the proposed mix design.

E. Shrinkage (Length Change):

1. Determine length change of hardened concrete test specimens in accordance with ASTM C 157 / C 157M, except as noted. Existing test data from previous projects with the same materials may be acceptable.
2. Test specimens shall be moist cured, including period in molds, for 7 days. After 7 days, the specimens shall be stored in air for a period of 28 days.
3. Utilize concrete materials in specified mix designs.
4. Report length change of specimens after periods of air drying after curing of 7, 14, and 28 days.
5. Average length change after 28 days shall be limited to .04%.

F. Normal Weight Concrete for all components of water bearing structures:

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,500 psi.
2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
3. Cement Content: Minimum 560 lb per cubic yard.
4. Water-Cementitious Material Ratio: Maximum 42 percent by weight.
5. Total Air Content: As specified, determined in accordance with ASTM C231/C231M.
    a. 5-8 percent for concrete exposed to freeze / thaw conditions.
    b. 0 percent entrained for all other conditions.
6. Maximum Slump: 4 inches (prior to high-range water reducing admixtures).
7. Maximum Aggregate Size: 3/4 inch.
8. Crystalline Admixture: Final rates determined by supplier.
    a. Product: Xypex C-500.
    b. Dosage Rate: 2-3 percent by weight of portland cement content.
9. Mix design shall comply within limits for Shrinkage (Length Change).
10. Products must meet NSF requirements

G. Normal Weight Concrete for interior structural slabs, concrete beams, concrete columns, pump bases, and other miscellaneous interior structural concrete (concrete not exposed to freeze thaw cycles:

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
3. Cement Content: Minimum 520 lb per cubic yard.
4. Water-Cement Ratio: Maximum 45 percent by weight.
5. Total Air Content: 0 percent (no entrained air)
6. Maximum Slump: 4 inches (prior to high-range water reducing admixtures).
7. Maximum Aggregate Size: 3/4 inch.

H. Normal Weight Concrete for exterior structural slabs, foundation mat slabs, foundation footings, foundation walls, and other miscellaneous exterior structural concrete (concrete exposed to freeze thaw cycles):

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
3. Cement Content: Minimum 520 lb per cubic yard.
4. Water-Cement Ratio: Maximum 45 percent by weight.
5. Total Air Content: 5-8 percent, determined in accordance with ASTM C231/C231M.
6. Maximum Slump: 4 inches (prior to high-range water reducing admixtures).
7. Maximum Aggregate Size: 3/4 inch.

I. Normal Weight Concrete for miscellaneous concrete elements, pipe supports, equipment pads, and housekeeping pads:

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,500 psi.
2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
3. Cement Content: Minimum 470 lb per cubic yard.
4. Water-Cement Ratio: Maximum 45 percent by weight.
5. Total Air Content: As specified, determined in accordance with ASTM C173/C173M.
   a. 5%-8% percent for concrete exposed to freeze / thaw conditions
   b. 0 percent for all other conditions
6. Maximum Slump: 4 inches.
7. Maximum Aggregate Size: 3/4 inch.

2.09 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685. Mix each batch not less than 2 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

B. Construction Joints:

1. Submit proposed construction joint locations for Engineer approval.
2. Spacing of joints shall follow spacings specified on Drawings and below requirements.
3. Joint Location: Any deviations to be approved by Engineer.
    a. Column and Walls: Wall shall be poured monolithically the full height as shown on the Drawings. Walls shall be divided into wall pour lengths as shown on the Drawings. Joints at corners to be located as shown on the Drawings.
    b. Mat Foundation Slabs: Slab shall be divided into approximate squares with maximum joint spacing as shown on Drawings.
    c. Beams and Girders: Joints shall be located within the middle third of the span. At beam intersections, joints must be offset a minimum of twice the beam width.
    d. Suspended Slabs: Joints shall be located within the middle third of the span. Locate joints into approximate squares with a maximum joint spacing of 40 feet.

C. Abutting sections of concrete elements shall not be placed within a 48 hour period.

D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.

1. Use latex bonding agent only for non-load-bearing applications.

E. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches (150 mm). Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

1. Vapor Retarder Over Granular Fill: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.

3.03 PLACING CONCRETE

A. Place concrete in accordance with ACI PRC-304.

B. Place concrete for floor slabs in accordance with ACI PRC-302.1.

C. Notify Engineer not less than 24 hours prior to commencement of placement operations.

D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

E. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

F. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

G. Pumping systems used to convey concrete shall limit slump loss to not exceed 1 inch. The slump loss shall be determined by tests made at each end of the pumping system.

H. Concrete shall be placed so that segregation does not occur. Downpipes or tremies shall be used to place concrete as close to its final destination as possible.

1. Concrete's free fall should not exceed 4 feet.

I. Concrete is to be placed in horizontal uniform layers not to exceed 24 inches. Consolidate concrete by mechanically vibrating.

J. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.04 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. An independent testing agency, as specified in Section 01 45 00 - Quality Control , will inspect finished slabs for conformance to specified tolerances.

B. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:

1. Exposed to View and Foot and Vehicle Traffic: F(F) of 25; F(L) of 20.
2. Under Thick-Bed Tile: F(F) of 20; F(L) of 15, on-grade only.
3. Under Carpeting: F(F) of 25; F(L) of 20, on-grade only.
4. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.

C. Measure F(F) Floor Flatness and F(L) Floor Levelness in accordance with ASTM E1155/E1155M (ASTM E1155M), within 48 hours after slab installation; report both composite overall values and local values for each measured section.

D. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.

E. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.05 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch (6 mm) or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch (6 mm) or more in height. Provide finish as follows:

1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal. The rubbing shall remove all form marks and surface irregularities and provide a smooth texture and uniform color.
2. Coordinate with requirements of section 09 90 02 High Performance Painting and Coating.
    a. Mock up panel to detemine acceptable finish for coatings

D. Concrete Slabs: All slab finishes must be verified with Engineer prior to concrete placement. Finish to requirements of ACI 302.1R, and as follows:

1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI PRC-302.1; thick floor coverings include quarry tile, ceramic tile, and Portland cement terrazzo with full bed setting system.

2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI PRC-302.1; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.
3. Other Surfaces to Be Left Exposed: Trowel as described in ACI PRC-302.1, minimizing burnish marks and other appearance defects.
   a. Hardener/Densifier/Sealer: As specified in Section 03 35 11.
4. Exterior Concrete Slabs: "Steel trowel with light broomed surface" as described in ACI 302.1R.

E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.06 CURING AND PROTECTION

A. Comply with requirements of ACI 308.1 . Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than seven days.

C. Formed Surfaces:

1. Initial Curing: Start as soon as forms have been removed. Keep continuously moist for not less than seven days by saturated burlap or water-fog spray.
   a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 7 days.
   b. Spraying: Spray water over floor slab areas and maintain wet.
   c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.

D. Surfaces Not in Contact with Forms:

1. Slabs and Floors To Receive Epoxy Coated Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than seven days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.

a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 7 days.
b. Spraying: Spray water over floor slab areas and maintain wet.
c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.

3. Final Curing: Begin after initial curing but before surface is dry.
a. Moisture-Retaining Sheet: Lap strips not less than 3 inches (75 mm) and seal with waterproof tape or adhesive; secure at edges.

3.07 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 00 - Quality Control.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

E. Compressive Strength Tests: ASTM C39/C39M. For each test, in accordance with ASTM C31, mold and cure five concrete test cylinders.

1. Sample frequency: Obtain test samples for every concrete pour greater than five (5) cubic yards. Additionally obtain test samples for every 50 cu yd of concrete placed.
2. Test cylinders to be tested at the following age: One (1) at 7 days, three (3) at 28 days, and one (1) at 54 days.
3. Additional concrete cylinders to be tested at days other than those specified above must be requested by the Contractor. Costs of additional cylinders will be by the Contractor.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

H. Perform one air test for each set of test cylinders taken. Air content shall be tested per ASTM C231. Concrete tested for air shall be sampled for at the point of discharge where pumping is being used.

I. Take and record temperature of all concrete tested in accordance with ASTM C1064.

J. Maintain records of concrete placement. Record date, location, time truck left plant, time truck started emptying, time truck empty, quantity, air temperature, and test samples taken.

K. Test completed water bearing structures as specified in Section 03 96 90. Patch and repair completed structures as required to meet specified requirements.

3.08 PATCHING AND REPAIR

A. Allow Engineer to observe concrete surfaces immediately upon removal of forms. Patch imperfections as specified in Section 03 01 00 per manufacturer's instructions. Areas patched prior to Engineer's observation and concurrence will require removal of patching material to allow observation. Costs associated with removal and replacement shall be paid by the Contractor.

3.09 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

C. If concrete tests fail to meet required strength, additional tests will be directed by Engineer. If additional tests fail to confirm required strength, the Contractor shall pay for all the cost of Work to replace defective concrete. Contractor shall pay for all additional tests and engineering services.

D. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

E. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.10 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

B. Do not allow construction loads in excess of final design loads on any structural concrete members without shoring and possible re-shoring.

END OF SECTION

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DIVISION 09
FINISHES

SECTION 09 90 00
PAINTING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes painting requirements for all components.

1. Surface Preparation
2. Paint Products
3. Schedule

B. Related Sections Include:

1. Section 01 33 00 – Submittal Procedures.
2. Section 01 61 00 – Common Product Requirements.
3. Division 33 – Utilities.
4. Division 40 – Process Integration.
5. Division 46 – Water and Wastewater Process Equipment.

1.02 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
2. ASTM D3359 – Standard Test Methods For Measuring Adhesion by Tape Test.
3. AMPP (Association for Materials Protection and Performance) - Note AMPP has been formed by the merger of NACE and SSPC standards programs.
4. NACE (National Association of Corrosion Engineers) – Industrial Maintenance Painting.
5. SSPC (Steel Structures Painting Council) – Steel Structures Painting Manual.
6. Ten States Standards, Recommended Standards For Water Works – 2.14 Piping Color Code.

1.03 DEFINITIONS

A. Conform to ANSI/ATSM D16 for interpretation of terms used in this Section.

1.04 SUBMITTALS

A. Submit product data under provisions of Section 01 33 00.

B. Provide Product data on all Products.

C. Submit samples under provisions of Section 01 33 00.

D. Submit two (2) sample sheets illustrating available colors for each scheduled surface finish Product.

E. Submit manufacturer's application instructions under provisions of Section 01 33 00.

1.05 QUALITY ASSURANCE

A. Product Manufacturer: Company specializing in manufacturing quality paints and finish products with minimum three (3) years experience.

B. Applicator: Company specializing in commercial painting and finishing with five (5) years documented experience.

C. Contractor provide:

1. Manufacturer’s certification that proposed coating system meets specified performance requirements.
2. SSPC visual standards on-Site.
3. Paint thickness measurement instrument on-Site.

1.06 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 61 00.

B. Deliver products to Site in sealed and labeled containers; inspect to verify acceptance.

C. Container labeling to include manufacturer's name, type of coating, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.

D. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in well ventilated area, unless required otherwise by manufacturer's instructions.

E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless allowed otherwise by manufacturer's instructions.

C. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the Product manufacturer.

D. Provide lighting level of 80-foot candles measured mid-height at substrate surface.

1.08 EXTRA STOCK

A. Provide a one (1) gallon container of each color and type of paint to Owner.

B. Label each container with color and room locations, in addition to the manufacturer's label.

1.09 REGULATORY REQUIREMENTS

A. Conform to applicable State Department of Health, Environmental Protection Agency, Ten States Standards, Uniform Building and Uniform Fire Codes and Standards.

B. All Products that may come into contact with water intended for use in a Public Water System shall meet American National Standards Institute (ANSI)/National Sanitation Foundation (NSF) International Standards 60 and 61, as appropriate. A Product will be considered as meeting these standards if so certified by NSF, the Underwriters Laboratories, or other organization accredited by ANSI to test and certify each Product.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. All paint materials selected for coating systems for each type of surface shall be the Product of one manufacturer.

1. Tnemec
2. Sherwin-Williams (SW) Industrial Coating
3. Or Approved Equivalent

2.02 MATERIALS

A. Coatings: Ready mixed, except field-catalyzed coatings. Process pigments to soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.

B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.

C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners, and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.03 FINISHES

A. Refer to schedule at end of Section for surface finish.

B. Colors shall be selected by the Engineer, Architect, and Owner.

C. Where more than one coat is required, there shall be contrasting colors for each.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive Work as instructed by the Product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of Work. Report any condition that may potentially affect proper application.

C. Test shop applied primer and finishes for compatibility with subsequent cover materials.

D. Beginning installation means acceptance of substrate condition.

3.02 PREPARATION

A. General:

1. Prepare surfaces per Drawings, Specifications, and manufacturer's recommendations.
2. Remove and protect electrical plates, hardware, light fixture trim, and fittings, if any, prior to preparing surfaces or finishing.
3. Correct minor defects and clean surfaces, which affect Work of this Section.
4. Seal marks which may bleed through surface finishes.
5. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to thoroughly dry.
6. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
7. Concrete and Concrete Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by

weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

8. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime shop primed items, as indicated.
9. Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.
10. Lightly sand (or SP-6) all installed pipe and solvent clean prior to painting.

B. Surface Preparation Methods:

1. Block – Cinder and Concrete: N/A.
2. Concrete – Newly Poured:
    a. Cure: Concrete must be cured prior to coating application. Cured is defined as concrete poured and aged at a material temperature of at least 75o F for at least 30 days. The pH of the surface should be between 6 and 9.
    b. Moisture (ASTM D4263): Concrete must be free of moisture as much as possible (20% or less). Test for moisture or dampness by taping the four edges of an 18-inch by 18-inch plastic sheets (4 mils thick) on the bare surface, sealing all of the edges. After a minimum of 16 hours, inspect for moisture, discoloration, or condensation on the concrete or the underside of the plastic. If moisture is present, the source must be located and the cause corrected prior to painting.
    c. Temperature: Air, surface, and material temperature must be at least 50 degrees F (10 degrees C) during the application and until the coating is cured.
    d. Contamination: Remove all grease, dirt, loose pinot, oil, tar, glaze, laitance, efflorescence, loose mortar, and cement.
    e. Surface Condition: Hollow areas, bug holes, honeycombs, voids, fins, form marks, protrusions, or rough edges are to be ground or stoned to provide a smooth, continuous surface of suitable texture for proper adhesion of the coating. Imperfections may require filling with a compatible material.
    f. Concrete Treatment: Hardeners, sealers, form release agents, curing compounds, and other concrete treatments must be compatible with the coatings, or be removed.
3. Existing Poured Concrete Surfaces Scheduled to Receive Paint/Coating Materials: N/A.
4. Previously Coated Surfaces: N/A.
5. Steel and Ductile Iron:
    a. Remove all loose mill scale, loose rust, and other detrimental foreign matter by power tool chipping, descaling, sanding, wire brushing, or grinding.
    b. Before power tool cleaning, remove visible oil, grease, soluble welding residuals, and salts.

6. Copper:
    a. Remove all oil, grease, dirt, oxide, and other foreign material by hand tool cleaning similar to that of steel surfaces. Preparation shall include solvent cleaning and light abrasion for an anchor profile.

3.03 PROTECTION

A. Protect elements surrounding the Work of this Section from damage or disfiguration.

B. Repair damage to other surfaces caused by Work of this Section.

C. Furnish and utilize drop cloths, shields, containment, and other necessary protective methods to prevent blast media, fumes, over spray, or droppings from disfiguring other surfaces.

D. The Contractor shall maintain explosion-proof ventilation during surface preparation, coating operations, and curing periods in compliance with OSHA and the State Department of Labor standards.

E. Remove empty paint containers and painting items from Site. Do not deposit in Owner receptacles for disposal. This includes empty containers, drop cloths, application devices, and other miscellaneous painting items.

3.04 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry.

C. Apply each coat to uniform finish.

D. Apply each coat of paint slightly darker than preceding coat, unless otherwise approved.

E. Sand lightly between coats to achieve required finish.

F. Allow applied coat to dry before next coat is applied.

G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

H. Prime back surfaces of interior and exterior woodwork with primer paint.

I. Prime back surfaces of interior woodwork scheduled to receive stain or varnish with gloss varnish reduced 25 percent with mineral spirits.

3.05 CLEANING

A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.

B. During progress of Work, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.

C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers, and remove daily from Site. Do not deposit in Owner receptacles.

3.06 FIELD QUALITY CONTROL

A. Test questionable coated areas as directed by ENGINEER.

3.07 SHOP PRIMED ITEMS

A. Refer to individual Sections for shop primed and pre-finished surfaces.

3.08 PAINT SCHEDULE REQUIREMENTS

A. Provide containment when near open basins. Containment area ventilation required to atmosphere.

B. In general, all new structures and items, including but not limited to the following surfaces, shall be painted, unless otherwise noted.

1. Prime and paint all visible surfaces of process pipes (insulated and non-insulated), valves, fittings, boxes, hangers, brackets, collars, supports, doors and door frames, except where items are prefinished.
2. Replace identification markings on mechanical or electrical equipment when painted accidentally.
3. Paint both sides and edges of any plywood backboards, if used, for electrical and telephone equipment before installing equipment.
4. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.
5. All surfaces not specifically excluded.

C. The following surfaces shall not be painted, unless otherwise shown on the Drawings.

1. Polished stainless steel.
2. Aluminum ladders, aluminum insulation jacketing, and miscellaneous aluminum items.
3. Bronze or brass items.
4. Prefinished items, unless noted otherwise.

3.09 PAINTING SCHEDULE

A. Paint schedule is for interior and exterior components.

SYSTEM	SURFACE TO BE PAINTED	NOTES	PAINT PRODUCT CODE NUMBER PRIME COAT	FIRST COAT	SECOND COAT
Ferrous Metals					
FM-A	Exterior Exposure	1	P1	P2	P3
FM-B	Interior Exposure	1,2	P1	P2	P2
FM-C	Immersion	3	--	P8	P8
Galvanized Steel and Nonferrous Metals					
NF-A	Exterior Exposure	2	P1	P3	--
NF-B	Interior Exposure	2	P1	P2	--
NF-C	Immersion	4	P1	P2	--
Steel					
S-A	Exterior Exposure	5	P1	P2	P3
S-B	Interior Exposure	5	P1	P2	--
S-C	Immersion	6	--	P8	P8
Factory Primed Steel/Prefinished Items					
FPS-A	Exterior Exposure	13	*	P12	P3
FPS-B	Interior Exposure	13	*	P12	P2
- Factory Primed/Prefinished.					
- Reference 3.01.C for compatibility test with prefinished items.					
Masonry (Standard Weight)					
N/A					
Concrete					
N/A					
Miscellaneous					
MI-A	PVC Piping	11	--	P2	P2
MI-B	Plaster and Gypsum Wallboard	--	P9	P10	--
MI-C	Wood	12	P11	P10	--

B. Process Piping Paint Color Schedule

1. Ductile iron process pipe for potable water within the tower control room shall be painted blue in conformance with APWA Uniform Color Code.

3.10 COATING PRODUCTS

CODE NO. Protective Paints	GENERIC NAME	MANUFACTURER AND PRODUCT	REQUIRED DFT. (MILS)
P1	Aromatic Urethane Zinc Rich Primer	"T" Series 91-H20 Hydro-Zinc	2.5-4.0/coat
P2	Polyamidoamine Epoxy	"T" Series N140– color Pota-Pox Plus	4.0-6.0/coat
P3	Acrylic Polyurethane	"T" Series 73 – color Endura-Shield	3.0-5.0/coat
P4	Ultra-High Solids* Polyamine Epoxy	"T" Series 280 – color Tneme-Glaze	6.0-8.0/coat
P5	Ultra-High Solids* Epoxy Primer	"T" Series 201-clear Epoxoprime	6.0-8.0/coat
P6	Ultra-High Solids* Epoxy Primer	"T" Series 201-clear Epoxoprime	6.0-8.0/coat
P7	Acrylic Emulsion	"T" Series 6 – color Tnene-Cryl	2.0-3.0/coat
P8	Polyamidoamine Epoxy	"T" Series N140 - color Pota-Pox Plus	4.0-6.0/coat
P9	Vinyl Acrylic	"T" Series 51-792 PVA Sealer	1.0-2.0/coat
P10	Waterborne Acrylic Epoxy	"T" Series 113 – color H.B. Tneme-Tufcoat	4.0-6.0/coat
P11	Alkyd	"T" Series 36 – white Undercoater	2.0-3.5/coat
P12	Epoxy Polyamide	"T" Series N27 S.T. – color	

3.11 NOTES FOR SURFACE PREPERATION SCHEDULE

A. Spot prime shop-primed surfaces.

B. Prime non-shop-primed surfaces.

C. Contact paint supplier representative for recommended surface preparation.

D. SSPC-SP1 followed by brush off blast. Clean and dry surface.

E. SSPC-SP6. Clean and dry surface.

F. SSPC-SP10. Clean and dry surface.

G. Block filler.

H. Allow mortar to cure for 28 days. Level protrusions and mortar splatter and thoroughly clean.

I. Brush off blast. Clean and dry surface.

J. Shot blast or mechanically abrade. Clean and dry surface.

K. Scarify surface.

L. Sand rough areas. Seal knots and pitch pockets. Fill cracks and nail holes after primer is dry.

M. Clean and dry surface.

END OF SECTION

DIVISION 26
ELECTRICAL

SECTION 26 00 00
ELECTRICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. The Electrical General Requirements outlined in this specification shall apply to Division 26 Electrical Specifications.

B. The Contractor shall provide supervision, labor, material, equipment, machinery and any other items necessary to complete the electrical systems. Items of equipment are specified in the singular; however, the Contractor shall provide and install the number of items of equipment as indicated in the drawings, and as required for complete systems.

1.02 PERMITS AND FEES

A. The Contractor shall give necessary notices, obtain permits and pay government and state sales taxes, fees, and other costs, including utility connections or extensions; file necessary plans, prepare documents and obtain necessary approvals of governmental departments having jurisdiction; obtain required certificates of inspection for the work and deliver same to the Engineer before request for acceptance and final payment of the work.

1.03 INTENT

A. It is the intention of these specifications and drawings to call for finished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean "furnish and install complete and ready for use."

1.04 SURVEYS AND MEASUREMENTS

A. The Contractor shall base measurements, both horizontal and vertical, from established benchmarks. All work shall agree with these established lines and levels. Verify measurements at site and check correctness of same as related to the work.

B. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, they shall notify the Engineer, through the General Contractor, and shall not proceed with the work until they have received instructions from the Engineer.

1.05 DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the contract. The engineering drawings and details shall be examined for exact locations of fixtures and equipment. Where they are not definitely located, this information shall be obtained from the Engineer.

B. The Contractor shall follow drawings in laying out work, and check drawings of other trades to verify spaces in which work will be installed.

1.06 "OR EQUAL"

A. Wherever the words “or equal" or “equal to” or “equivalent” are used in connection with any specified material, it is to be understood that such words mean any material or work of any kind claimed to be an equal in quality to the work or material specified but does not require prior written approval by the Engineer.

B. Wherever the words "approved equal" or "prior approved equivalent" are used in connection with any specified material, it is to be understood that such words mean any material or work of any kind claimed to be an equal in quality to the work or material specified and shall be so approved in writing by the Engineer.

C. It is further understood that no material or work shall be presented to the Engineer as work or material equal to that specified with the full understanding on the part of the manufacturers and agents for the so called "equal" material, and the full understanding on the part of the Contractor, that the Engineer is to use his own judgment in the matter, that his decision is final, and that in the event of an adverse condition, no claim of any sort shall be made against the Owner or Engineer.

1.07 SHOP DRAWINGS

A. The Contractor shall submit for approval, detailed shop drawings of all equipment and material required to complete the project, and no material or equipment may be delivered to the job site or installed until the Contractor has in his possession the approved shop drawings for the material or equipment. The shop drawings shall be completed as described by Specification Section 01 33 00 - Submittal Procedures.

1.08 EQUIPMENT DEVIATIONS

A. Where the Contractor proposes to use an item of equipment other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundations, piping, wiring, or any other part of the mechanical, electrical, or structural layout; such redesign, new drawings and

detailing required therefore shall be prepared by the Contractor at his own expense and approved by the Engineer.

B. Where such approved deviation requires a different quantity and arrangement of wiring, conduit, and equipment from that specified or indicated on the drawings, the Contractor shall furnish and install any such controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system at no additional cost to the Owner.

1.09 COOPERATION WITH OTHER TRADES

A. This Contractor shall give full cooperation to other trades and shall furnish in writing to the Contractor, with copies to the Engineer, any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

B. Where the work of the Contractor will be installed in close proximity to, or will interfere with the work of other trades, they shall assist in working out space conditions to make a satisfactory adjustment. If the Contractor installs their work before coordinating with other trades or so as to cause any interference with work of other trades, they shall make the necessary changes in his work to correct the condition without extra charge.

C. The Contractor shall furnish to other trades, as required, necessary shop details for the proper installation of work and for the purpose of coordinating adjacent work.

D. Refer to other Divisions of the Specifications for equipment furnished by others and work required thereof by the Contractor.

1.10 PROTECTION

A. The Contractor shall protect work and material from damage by their work or workmen and shall be liable for damage thus caused.

B. The Contractor shall be responsible for work and equipment until finally inspected, tested, and accepted; contractor shall protect work against theft, injury or damage; and shall carefully store material and equipment received on site, which is not immediately installed. Contractor shall close open ends of work with temporary covers or plugs during storage and construction to prevent entry of obstructing material.

1.11 SCAFFOLDING, RIGGING, HOISTING

A. The Contractor shall furnish scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any electrical equipment and

electrical apparatus furnished. Remove scaffolding, rigging, hoisting, and services from premises when no longer required.

1.12 MATERIAL AND WORKMANSHIP

A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new of first-class quality, and shall be furnished, delivered, erected, connected, and finished in every detail, and shall be so selected and arranged as to fit properly into the available spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the Engineer shall be furnished.

B. The Contractor shall furnish the services of an experienced superintendent who shall be constantly in charge of the installation or work, together with skilled workmen, helpers, and labor required to unload, transfer, erect, connect, adjust, start, operate, and test each system. The job superintendent shall be a Master Electrician licensed in the State where the work is being performed.

C. Unless otherwise specifically indicated on the plans or specifications, all equipment and materials shall be installed with the approval of the Engineer in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

1.13 STANDARDS AND CODES

A. Provide all material, equipment, and work in accordance with applicable rules, codes, ordinances and regulations of local, state, federal governments, local utility companies, and other authorities having lawful jurisdiction. Conform to the latest editions and supplements of codes, standards, and recommended practices in addition to the following:

1. Safety Codes:
    a. National Electrical Safety Code Handbook
    b. Occupational Safety and Health Standard (OSHA)
2. National Fire Codes:
    a. NFPA 70 - National Electric Code (NEC)
3. Underwriters Laboratories, inc.:
    a. UL 508A Standard - Industrial Control Panels
    b. All applicable UL standards as referenced in other sections.
    c. All material and equipment for the electrical portion of the system shall bear the approval label, or shall be listed by Underwriter's Laboratories, Limited Liability company or another Nationally Recognized Testing Laboratory (NRTL) approved by OSHA and the local electrical inspector.
4. Third Party Certifications:
    a. All equipment not bearing a UL listing shall be provided with a third-party certification stamped by a registered Professional

Engineer licensed in the state of which the work is being performed.

5. State Electrical Board:
   a. Laws, Rules, Wiring Standards, and applicable local state standards.

B. Drawings and specifications indicate minimum construction standards. Should any work indicated be substandard to any ordinances, lower codes, rules or regulations bearing on work, the Contractor shall promptly notify the Engineer in writing, through the General Contractor, of any necessary changes to be adjusted. However, if Contractor provides any work knowing it to be contrary to any ordinances, laws, rules and regulations, they shall thereby have assumed full responsibility and bear all costs involved for correction and compliance. In any instance where the specifications call for materials for construction of a better quality or larger size than required by codes, provisions of these specifications shall take precedence. Codes shall govern in case of direct conflict between codes, plans and specifications.

1.14 TESTS AND OPERATION RECORDS

A. Test all equipment installed and demonstrate its proper operation to the Engineer. No equipment shall be tested or operated for any other purpose, such as checking motor rotation, until it has been fully lubricated in accordance with manufacturer's instructions and, if it is a centrifugal pump, until it has been connected to piping systems and supplied with sufficient water so that it will not run dry.

1. Any defects in workmanship, material, equipment or any grounds or short circuits shall be corrected by the Contractor before final acceptance.
2. Submit a searchable electronic copy or a minimum of three (3) copies of data noted below to the Engineer prior to final inspection.
3. Maintain a marked set of drawings to record all deviations made from routes, locations, circuiting, etc. shown on contract drawings. Prior to final inspection submit one new set of project drawings with deviations and changes clearly indicated.

B. The entire electrical system shall be tested by Contractor in presence of the Engineer. Every local switch, panelboard, service breaker, safety switch, and circuit breaker shall be operated under load conditions. Every fixture and equipment tested and operated. Tests shall include any tests specified in any part of this section.

1. The Contractor shall measure resistance of electrical system with a "Megger" from busses of main switch to ground with main breaker open, and bonding jumper between neutral and ground temporarily removed. Values are to be determined with all panelboards, motor controls and

switch circuits open. If any value measured is less than 100,000 ohms, each feeder shall be measured and must exceed those set forth in Article 110 of National Electrical Code, before they shall be accepted. Typewritten test results shall be furnished to the Engineer.

C. Recording and Distribution

1. Record nameplate horsepower, amperes, volts, phase, efficiency, service factor and other necessary data on motors, and other electrical equipment furnished and/or connected under this contract.
2. Record motor starter catalog number, size and rating and/or catalog number of thermal overload units installed in all motor starters furnished and/or connected under this contract. See motor starter specifications for instructions for proper sizing of thermal overload units.
3. Record ampere per phase at normal or near normal loading of each item of equipment furnished and/or connected.
4. Record voltage and ampere per phase readings taken at service entrance equipment after completion of project with operation at normal electrical load.
5. Record all VFD settings, solid-state motor controller settings, electronic overload relay settings, relay settings, device settings, and related electronic equipment settings.
6. Record all instrumentation and device calibration settings.
7. Distribute copies of recorded information to the Engineer along with the project O&M manuals.

1.15 DEMONSTRATION OF COMPLETED ELECTRICAL SYSTEMS

A. General: Upon completion of entire electrical systems, Contractor shall demonstrate to Engineer's satisfaction that all installed electrical systems are in perfect operating condition, that they perform all power and control functions intended and that they are installed in strict accordance with project drawings and specifications.

B. Materials: Contractor shall provide necessary testing equipment, tools, materials, dummy loads, etc., required to properly demonstrate performance.

1.16 OPERATING AND MAINTENANCE INSTRUCTIONS

A. The Contractor shall submit O&M manuals for approval of all equipment and material required to complete the project per Specification Section 01 78 23 - Operation and Maintenance Data.

END OF SECTION

SECTION 26 05 02
EXCAVATING, TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

A. Provide trenching/backfill/compaction/surface restoration required to install

1.02 QUALITY ASSURANCE

A. Engineer may have compaction tests taken by an independent testing laboratory. Cost will be paid by Owner unless tests indicate compaction does not meet Specifications in which case costs of initial test and any retesting will be paid by the Contractor and not charged to the Owner.

B. Properly protect existing surfaces and items not included in this work and repair any damage to original condition.

C. Take precautions to guard against movement, settlement, collapse, or other damage of existing construction and finish grade and repair any damage to original condition.

D. Perform construction stakes, lines, and grades under direct supervision of a Registered Land Surveyor or Registered Civil Engineer.

1.03 EXISTING CONDITIONS

A. Determine exact locations of existing utilities before commencing work. Contractor is responsible for damages incurred by his failure to locate and preserve underground utilities. It is Contractor's responsibility to contact "One Call Locators" prior to performing any excavation.

PART 2 PRODUCTS

2.01 GENERAL BACKFILL REQUIREMENTS

A. Special Fill Gravel (Inside Building Line):

1. Washed type with 100% passing 3/4" sieve and gradation to ensure compactibility with no more than 5% passing No. 200 sieve.

B. Outside Building Line: Native backfill.

PART 3 EXECUTION

3.01 INSTALLATION

A. Clear trenching work area.

B. Excavate to depths as indicated on drawings or as required by NEC, whichever is greater.

C. Provide electrical ribbon marker tape above conduits in each trench.

D. Notify Engineer immediately if during progress of work, subsurface conditions are encountered which are different from those ordinarily anticipated.

E. Excavated material, free from foreign material, may be used for backfilling outside building and rough grading. Remove any excess from site.

F. Fill excavation below required depth with compacted special fill gravel as per section 2.01.

G. Protect bottom of excavation from frost and do not place structures or conduit on frozen ground.

H. FILL WITHIN BUILDING (Under Concrete Slabs on Grade):

1. Place and compact fill in successive layers not to exceed eight (8) inches before compaction. Compact to minimum of 95% per ASTM D698.

I. Nonorganic material from building excavating may be used for fill within building.

J. Place a six-inch layer of special fill gravel per spec section 2.01 immediately below the floor slab.

K. BACKFILL OUTSIDE BUILDING:

1. Do not start backfilling until the work which will be covered is completed and areas are free of foreign material.
2. Place and compact fill in successive layers not to exceed eight (8) inches before compaction. Compact to minimum of 95% per ASTM D698.

L. Nonorganic material excavated from foundation areas may be used as backfill in exterior areas.

3.02 ROUGH GRADING

A. Clean areas of foreign material. Using stockpile excavation materials or off site material of equal quality, bring grades to within 6 inches of finish grade elevations.

3.03 FINISH GRADING

A. Using stockpile topsoil from stripping or off site topsoil of equal quality finish grade areas within construction limits to given minimum of 6 inches material depth. Bring to elevations indicated on Drawings or existing elevations.

3.04 BLACK DIRT

A. Place 6 inches under lawns.

B. Restore surface to original condition.

END OF SECTION

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SECTION 26 05 08
ELECTRICAL SERVICE

PART 1 GENERAL

1.01 SUMMARY

A. Montana Dakota Utilities (MDU) will provide a new 277/480V, 3PH, 4W Service (for Pre-manufactured Pump Station).

B. Montana Dakota Utilities (MDU) will provide a new 120/240V, 1PH, 3W Service (for Meter Vault).

C. Associated Charges:

1. All charges payable to MDU shall be paid by the Owner outside of this Contract.

1.02 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code.

1.03 EXISTING CONDITIONS

A. Contact the Utility Company for verification of the exact connection point for each service required.

PART 2 EXECUTION

2.01 INSTALLATION

A. Verify requirements and installation locations with Utility Company before installation.

B. Terminate rigid metallic service conduit (if used) in transition cabinet, meter socket, and combination main switch/automatic transfer switch with grounding bushing.

C. Make ground connection from bushing to ground bus.

D. The serving electric Utility Company is:

1. MDU
   a. Attn: Loni Wortham
   b. Phone: 701 -713-0533
   c. Email:loni.wortham@mdu.com

E. All work will be coordinated with Utility and Owner and scheduled for minimum of service interruption.

F. Summary of Site Electrical Service Installation (Pre-manufactured Pump Station):

1. Primary circuitry cable and associated trenching by serving electric utility. Conduit by contractor in accordance with serving utility standards.
2. Site preparation and transformer pad by Electrical Contractor in accordance with utility standards.
3. Transformer furnished and installed by serving electric utility. Terminations, primary and secondary, by serving electric utility.
4. Circuitry between utility transformer and utility disconnect (non-fused) by serving electric utility. Utility disconnect provided by Electrical Contractor and mounted in accordance with serving utility standards. Utility disconnect shall be 400A 3P 4W heavy duty NEMA 3R disconnect, 600V rated
5. Terminations within utility disconnect shall be by serving electric utility.
6. Circuitry between utility disconnect and meter socket shall be by electrical contractor.
7. Meter socket furnished and installed by electrical contractor in accordance with utility standards. Meter head provided by serving electric utility.
8. Circuitry between service entrance disconnect and meter socket shall be by electrical contractor.
9. Primary and secondary terminations at meter socket by Electrical Contractor.
10. All work downstream of service entrance disconnect shall be by Electrical Contractor.

G. Summary of Site Electrical Service Installation (Meter Vault):

1. Primary circuitry cable and associated trenching by serving electric utility. Conduit by contractor in accordance with serving utility standards.
    a. Final location of utility primary connection point to be determined during construction. Assume 250' of trench and conduit for bidding purposes.
2. Site preparation by Electrical Contractor in accordance with utility standards.
3. Transformer furnished and installed by serving electric utility. Terminations, primary and secondary, by serving electric utility.
4. 100A, 120/240 Vac, 1 Phase, NEMA3R metered pedestal (Midwest or Milbank) with lever bypass, service entrance rated, with 100A/2P Main Breaker with (1) 60A/2P and (2) 20A/1P GFCI branch circuit breakers furnished and installed by Electrical Contractor. Metered pedestal shall comply with utility companies standards.
5. Circuitry between utility transformer and metered pedestal by serving electric utility.

6. Terminations within metered pedestal (line side) by utility, terminations within metered pedestal (load side) by electrical contractor.
7. All work downstream of metered pedestal shall be by Electrical Contractor.

END OF SECTION

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SECTION 26 05 19
POWER AND INSTRUMENTATION CABLE - LESS THAN 600V

PART 1 GENERAL

1.01 REFERENCE STANDARDS:

A. UL 486A-486B - Wire connectors

B. NEMA WC 70

C. NEMA WC30-1976

D. NFPA 70 - National Electrical Code, current adopted Edition.

E. NFPA 79 - Electrical Standard for Industrial Machinery.

1.02 DELIVERY, STORAGE, AND HANDLING:

A. Deliver conductors to project on standard coils or reels and suitably protected from weather and damage during storage and handling.

1.03 APPROVAL DRAWINGS

A. Provide Shop Drawings on all products identified herein.

PART 2 PRODUCTS

2.01 CONDUCTORS

A. Type P1 - 600V Rated General Purpose Single Conductor Cable

1. Construction:
   a. #14 AWG and larger: Stranded Copper, (THHN/THWN-2). Solid Copper is acceptable for lighting and branch circuits.
   b. Conductors shall contain factory color coded insulation in standard colors to match the voltage level used.
   c. Sequential footage markers shall be factory installed on the insulation jacket.
   d. Provide Cable Tray (CT) rated cable where installed in cable tray.
   e. Aluminum conductors are not permitted.
2. Feeder Conductors:
   a. 98 percent conductivity copper, 600-volt insulation.
3. Branch Circuit Conductors:
   a. 98 percent conductivity copper, 600-volt insulation.
   b. Conductors smaller than No. 14 AWG are not permitted except in control panel.
4. Project Use Areas:
   a. General use indoor building circuiting.
   b. Not allowed for VFD output circuitry.

5. Manufacturer:
    a. Service Wire Co.
    b. Okonite Co.
    c. Southwire
    d. Belden
    e. Alpha Wire

B. Type P2 - 600V Rated Special Purpose Single Conductor Cable

1. Construction:
    a. XHHW-2 insulation which is moisture, heat, and flame-retardant cross-linked polyethylene covered with an overall flame retardant, moisture and sunlight resistant PVC jacket.
    b. Stranded Copper
    c. Conductors shall contain factory color coded insulation in standard colors to match the voltage level used.
    d. Sequential footage markers shall be factory installed on the insulation jacket.
    e. Provide Cable Tray (CT) rated cable if installed in cable tray.
    f. Aluminum conductors are not permitted.
2. Project Use Areas:
    a. 600V and less service entrance conductors and feeders routed underground from the exterior to the interior.
3. Manufacturer:
    a. Service Wire Co.
    b. Okonite Co.
    c. Southwire
    d. Belden
    e. Alpha Wire

C. Type S1 - Signal Cable - Single Pair - Shielded/Twisted

1. Construction
    a. Type CMP Single pair, twisted, 100% shield coverage, Class B, #16 AWG, stranded (19 x 29) tinned copper conductors (7 strand minimum).
    b. 600V minimum insulation rating.
    c. 15 mil (nominal), 90°C (194°F) PVC primary insulation with a flame retardant, low smoke PVC, plenum rated.
    d. Conductors shall be shielded with a 0.35 x 5 mil (min.), 100% coverage, aluminum or copper mylar tape shield, or equal with an 18-gauge strand copper drain wire.
2. Ratings/Listings:
    a. Flame Resistance: Comply with UL 1685 & NFPA 262
    b. UL Temperature Rating: 75°C Dry, 90°C wet (167°F dry, 194°F wet).
    c. ICEA S-73-532, S-61-402
3. Project Use Areas:
    a. Use cable for control circuiting requiring one shielded twisted pair from a control panel to a field instrument or similar application.

4. Manufacturer:
    a. Service Wire Co.
    b. Okonite Co.
    c. Southwire
    d. Belden
    e. Alpha Wire

2.02 BOLTED, PRESSURE TYPE CONNECTORS

A. Manufacturer:

1. Burndy.

B. Use: Connecting conductors to busbars, suitable for copper and aluminum conductors.

C. Size: As required for conductor.

2.03 SOLDERLESS CONNECTORS

A. Manufacturer:

1. 3M "Scotchlok"

B. Type: Twist-on, spring tension.

C. Use: With copper conductors only.

PART 3 EXECUTION

3.01 INSTALLATION

A. Conductors shall be installed within conduit or approved raceway unless noted otherwise.

B. Draw conductors into conduit only after conduit system is complete. Install in a manner so as not to injure insulation.

C. Use stranded, copper conductors only. Solid conductors are not acceptable.

D. Make splices on branch circuit conductors with solderless stapleless, mechanical wire connectors.

E. Tighten bolted, pressure type connectors to manufacturer's recommendations.

F. #10 AWG and smaller shall be stranded copper for motor and control circuits. Branch circuits for lighting and convenience outlets shall be solid copper.

G. Branch circuit homeruns greater than 50 feet shall be #10 AWG minimum.

H. Multiwire branch circuits shall have their neutral conductor increased 1 size relative to the phase conductors (i.e. if the phase conductors are #12 AWG, then the neutral shall be #10 AWG).

I. Make splices and terminations in control panel by using bolted, pressure type connections. Install according to manufacturer's recommendations.

J. Provide strain relief cord connectors and stainless-steel mesh on cords entering motor termination boxes, junction boxes or conduits.

K. Use factory color coded conductors with separate color for each phase and neutral conductor by integral pigmentation for conductor sizes.

L. Use the following color codes:

CONDUCTOR SYSTEM VOLTAGE-120/240, SINGLE PHASE

Phase A	Black
Phase B	Red
Neutral	White
Equipment Ground	Green

M. Lace or clip groups of feeder conductors in control panels, pull boxes, and wireways.

N. Use wiring pulling lubricant for pulling #4 AWG and larger wire.

O. Splice only in accessible junction or outlet boxes.

3.02 CABLE INSTALLATION CERTIFICATIONS

A. Installations and terminations of Ethernet and Fiber Optic network cabling shall be performed by BICSI Installer 2 certified installers with INSTC and INSTF certifications.

B. Contractor shall submit installer certification to project engineer prior to installation of any network cabling.

3.03 QUALITY CONTROL AND DOCUMENTATION

A. Final acceptance shall require:

1. OTDR traces for all fiber strands.
2. End-to-end loss test results.
3. Splice enclosure and termination panel documentation.
4. As-built drawings in both PDF and native CAD/GIS format (if applicable).

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Grounding system for electrical equipment and antenna masts. Equipotential ground loop around perimeter of building(s) and bond to main service equipment. Provide ground bars and ground test wells at locations indicated on the Drawings.

1.02 DESCRIPTION OF SYSTEM

A. Bond electrical equipment, control panels, panelboards, etc. to the metallic conduit system through conduit connectors or bonding jumpers, as required, to provide effective electrical continuity.

1.03 QUALITY ASSURANCE

A. NFPA 70 (National Electrical Code), article 250.

PART 2 PRODUCTS

2.01 GROUNDING CONDUCTORS

A. Copper, with green identification as specified in Section 26 05 19 - Power and Instrumentation Cable - Less Than 600V.

2.02 GROUND RODS

A. Type: Copper clad steel, 5/8-inch diameter, 10 feet long.

2.03 GROUND CLAMPS (CONCEALED)

A. Compression type grounding which meets IEEE 837.

B. Manufacturer: Panduit StructuredGround

2.04 GROUND FITTINGS AND LUGS (EXPOSED)

A. Manufacturer: Burndy Company

2.05 GROUND LUG

A. Located in electrical equipment.

2.06 GROUND ACCESS WELL

A. Open bottom rectangular well with access cover for testing and inspection of ground system.

B. Include a cover that is identified by permanent means with the word "GROUND".

PART 3 EXECUTION

3.01 POWER SYSTEM GROUNDING

A. Distribution System

1. Install grounding bars and grounding studs at locations indicated within the facility, distribution centers, pull boxes and panelboards. Bond metallic conduit systems and metallic piping with metallic clamps and bonding conductor for ground continuity.

B. Provide a properly sized copper grounding conductor in branch circuit and feeder conduits. Size the conductor according to Table 250-122 of the National Electric Code. Connect the grounding connector to grounding points (grounding bars, ground studs, etc.) in electrical enclosures, electrical equipment, junction boxes, and outlet boxes.

C. Ground and bond in accordance with National Electric Code, Article 250.

D. Provide one (1) additional ground rod adjacent to each SCADA antenna location and bond to metallic antenna mast. Provide bare stranded copper conductor of size shown on the Drawings in nonmetallic conduit from the antenna mast to ground and connect with proper irreversible compression type ground clamps.

END OF SECTION

SECTION 26 05 34
CONDUIT

PART 1 GENERAL

1.01 SUMMARY

A. Conduit system for conductors. Low voltage control conductors and fiber optic cabling shall be installed within conduit.

1.02 REFERENCE STANDARDS

A. UL 6 - Rigid metal conduit.

B. UL 360 - Liquid-tight flexible steel conduit.

C. UL 651 - Rigid non-metallic conduit.

D. UL 1203 - Explosion-Proof Electrical Equipment for use in Hazardous Locations

E. UL 1684 - Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

F. UL 2515 - Above Ground Thermosetting Resin Conduit (RTRC) and fittings.

G. UL 2420 - Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

H. NEMA Standard Publication TC-2 - Rigid PVC for underground installations.

I. NEMA Standard Publication RN 1-2005 – PVC coated rigid steel conduit.

1.03 DELIVERY, STORAGE AND HANDLING

A. Store in a dry area, protected from the weather.

1.04 SUBMITTALS

A. Submit product data and shop drawings in accordance with Specification Section 01 33 00 - Submittal Procedures.

PART 2 PRODUCTS

2.01 RIGID METAL CONDUIT (STEEL)

A. Manufacturer: Wheatland Steel Company

B. Type: Steel heavy wall; galvanized unless noted otherwise on Drawings.

2.02 RIGID METAL CONDUIT (ALUMINUM)

A. Manufacturer: Wheatland Steel Company

B. Type: 6063 aluminum alloy, T-1 temper, marine grade.

C. Manufactured in accordance with ANSI C80.5, UL 6A.

2.03 NON-METALLIC CONDUIT - PVC (HEAVY WALL)

A. Manufacturer: Carlon.

B. Type: Sch. 80 PVC, except where Sch. 40 is specified on Drawings.

2.04 EXPANSION FITTINGS

A. Manufacturer: OZ Electrical Manufacturing Company.

B. Material type shall match conduit.

2.05 HANGERS AND SUPPORTS

A. Manufacturer: B-Line Products.

2.06 SURFACE METAL WIREWAY

A. Manufacturer: Hoffman or Walker

B. Type: Lay-in with hinged cover and suitable fittings. Provide integral barrier where shown on the Drawings.

C. NEMA 12, NEMA 4, or NEMA 4X construction as called for on Drawings.

D. Areas noted as Class I, Division 1, Group D or Class I, Division 2, Group D shall require equipment listed for use in those specific areas.

2.07 CONDUIT SEALS

A. Manufacturer: Appleton.

B. Provide listed seal offs throughout Class I, Division 1, Group D or Class I, Division 2, Group D areas per NEC Articles 500 and 501.

C. Seals shall be field marked when poured.

2.08 NON-METALLIC EXPANSION FITTINGS

A. Manufacturer: Carlon.

B. Type: Suitable for use with nonmetallic conduit.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Size conduits as shown on the Drawings or as required by National Electrical Code (whichever is larger) for number and size of conductors installed. Minimum trade size is 3/4-inch; other sizes as required by NEC based on quantity of conductors.

B. Contractor shall not exceed 270 degrees of bend in any single conduit run without an additional pull point.

C. Raceways shall have an equipment ground conductor installed. The raceway shall not be utilized as an EGC.

D. Support conduits from structural system, independent of ductwork, ceiling system supports, and main runners. Do not support conduit from conduit. Tie wires to hang or strap conduits are not permitted.

E. Cut conduit joints square and ream smooth. Make bends with abender or utilize standard conduit elbows.

F. For buildings where walls are concrete or concrete blocks, Contractor shall core drill walls or coordinate reinforced, boxed out areas as required to install conduit in a neat and workmanlike manner. Contractor shall patch wall penetrations and prepare the surface for final paint.

G. Contractor shall provide sleeves or reinforced concrete boxed out openings through footings for underground conduits. Coordinate with General Contractor.

H. Securely fasten conduit and raceways with clamps with clamp backs, in order to keep an air gap between conduit and finished wall surfaces to reduce the potential of moisture induced corrosion. Anchors shall be lead, expansion type with stainless steel hardware. Route conduits parallel to and at right angles to building lines. Conduits mounted directly in contact with wall surface shall not be acceptable. Utilize unistrut and clamps using materials as shown below unless otherwise noted on the Drawings.

Indoor Dry Areas	hot dipped galvanized
Indoor damp/corrosive Areas	fiberglass
Exterior Areas	fiberglass

I. Route conduit continuous from outlet to outlet, outlet to cabinets, outlet to pull or junction boxes. Secure conduit to boxes with locknuts and bushings in such a manner to ensure each system is electrically continuous throughout.

J. Surface mount conduit in areas, unless noted otherwise. Conduits and outlet boxes on the building exterior shall be flush mounted where possible. If not,

install conduits within the building and then penetrate the wall directly into the back of light/outlet/etc. Intent is to eliminate/minimize the usage of surface mounted conduit on the exterior face of the building.

K. Cap ends of conduit to prevent entrance of foreign materials during construction.

L. Locate conduits poured in concrete entirely in the middle 1/3 of the concrete member.

M. Provide a 4-inch-high watertight barrier for conduits that pass vertically through a floor with a metal sleeve or concrete curb.

N. Provide “link seal” around conduits penetrating exterior walls/foundations and wet wells. Nuts on the link seal shall remain accessible from inside the building once link seal is installed. Non shrinking grout is acceptable for penetrations above finished grade.

O. Below grade non-metallic conduit shall be transitioned to PVC Coated Rigid Steel or RTRC (XW) before exposing above grade. Transition shall be made via below grade transition couplings to PVC Coated Rigid Steel or RTRC (XW) elbows/sweeps.

P. Conduits routed in hazards areas shall be rigid aluminum unless noted otherwise. Mount aluminum conduit on fiberglass strut with aluminum conduit straps only.

Q. Provide watertight installation where conduits pass through roof, wall, or waterproofing membranes.

R. Conduit systems shall be installed completely before conductors are pulled in.

S. Repair damage to insulation or interior vapor barrier where conduit enters air plenums.

T. Fill conduits which can admit air to or release air from air plenums through the connecting conduit system with sealing compound.

U. Provide firestopping around conduits penetrating fire rated walls.

V. Conduits used shall be of the Form 7 type or equivalent.

3.02 RIGID METAL CONDUIT (STEEL)

A. Rigid metal conduit shall be permitted in floor slabs or as specifically called for on the drawings.

B. Rigid metal conduit shall be required for exposed conduits unless otherwise noted on the Drawings.

C. Paint rigid metal conduit that is in contact with earth with coat of bitumastic paint. Paint couplings after assembly. Where bitumastic paint is applied the paint shall be thoroughly dried before backfilling.

D. Fittings type shall be threaded. Use threaded hubs (Myers hub) where rigid conduit is connected to a thread less box or enclosure for indoor and outdoor applications. Lock nut with O-Ring is not acceptable.

3.03 RIGID METAL CONDUIT (ALUMINUM)

A. Rigid aluminum conduit shall be required for exposed conduits and shall not come in contact with soil or concrete wall surfaces.

B. Install on fiberglass strut stand offs such that the conduit does not come into contact with concrete. When passing through a slab, ensure conduit is properly wrapped as per conduit supplier recommendations.

C. Fittings type shall be threaded. Use threaded hubs (Myers hub) where rigid conduit is connected to a thread less box or enclosure for indoor and outdoor applications. Lock nut with O-Ring is not acceptable. Fittings that come in contact with stainless steel shall be galvanized steel per NEC 344.14.

3.04 NON-METALLIC CONDUIT - PVC (HEAVY WALL)

A. Use rigid non-metallic, Sch. 80 PVC conduit for direct burial and exposed wet, caustic,or corrosive installations unless specifically noted otherwise on Drawings.

B. Cut conduit square with round edges removed from ends to protect the wires from abrasion. Make connections by solvent welding. Install fittings in accordance with the manufacturer's recommended procedures. Elbows 2” and larger shall be rigid metal conduit. Provide expansion joints where there are long runs of conduit, and a wide temperature differential exists. Use PVC coated RMC sweeps when penetrating through concrete floors.

C. Provide grounding conductor in control circuits, branch circuits, and feeder conduits.

D. Typical applications include underground and in chemical or caustic areas.

3.05 CAST IN PLACE CONDUIT INSTALLATION REQUIREMENTS

A. Conduits installed under the concrete floor within the extents of the building footprint shall not be acceptable unless specifically called out on drawings.

B. Structures with deep basements and foundation systems consisting of piles/screwed piers with grade beams and void forms shall have no conduits under the concrete floor.

C. Where conduits transition from below the concrete floor to above, vertically oriented couplings installed below slab shall be with threaded PVC coated rigid type. Other conduit types shall have no vertical couplings and be seamless and continuous from horizontal coupling to above concrete floor.

1. Do not route conduits through wet wells, clearwells, underground tanks, etc. unless required to feed equipment located within the same. Use PVC coated RMC or RTRC type XW sweeps whenever penetrating concrete floors or through below grade footings, etc. Schedule 80 PVC or RTRC type conduits shall be used under or cast into concrete floor slabs.

D. Schedule 40 PVC conduit shall be acceptable in concrete encased ductbanks.

E. Signal Circuits shall be installed in rigid conduit.

F. VFD Output Circuits and Signal Circuits shall utilize shielded VFD cable and shielded signal cable respectively.

G. Contractor shall submit a cast-in-place conduit routing plan showing conduit routes, sizes and quantity to Structural Engineer prior to any cast-in-place installation taking place.

3.06 CONDUIT COLOR

A. Color-coded conduit shall be utilized as noted below. EMT conduit shall be colored from the factory while RMC shall be painted on site.

1. Red - Fire Alarm Circuits
2. Blue - Network Cabling Circuits
3. Orange - UPS circuits

3.07 CONDUIT TYPES PERMITTED BY APPLICATION

A. Ensure that conduits and installations comply with the NEC, are certified and listed for their intended use, and are suitable for the environmental and operational demands of the application. Depending on the specific application, additional precautions may be required, such as applying corrosion-resistant coatings, special paint, or protective coverings to ensure durability and compliance in wet or corrosive environments. For installations in hazardous locations, the conduit shall also meet the specific requirements for classified areas, including explosion-proof ratings.

1. General interior areas: RMC (Steel)
2. Outdoor/Wet Environment: RMC (Steel)
3. Caustic/Corrosive Environment: RTRC and PVC (Sch. 80)
4. Buried in Earth: RTRC and PVC (Sch. 80)

END OF SECTION

SECTION 26 05 37
BOXES

PART 1 GENERAL

1.01 SUMMARY

A. Outlet boxes, junction boxes and pull boxes required to accomplish device and equipment installation, wire pulling shown on the Drawings and to comply with National Electric Code requirements for conduit and conductor installation.

1.02 DELIVERY, STORAGE AND HANDLING:

A. Store materials in a dry area, protected from the weather.

PART 2 PRODUCTS

2.01 PULL BOXES

A. Manufacturer: Hoffman

B. Type: Metal construction, conforming to National Electrical Code, with screw on or hinged cover.

C. NEMA type 12, 4, 4X, 7 enclosure.

D. Overlapping covers with flush head cover retaining screws, prime coated for flush mounted pull boxes.

2.02 SURFACE MOUNTED OUTLETS

A. Manufacturer: Crouse Hinds, Appleton.

B. Type: FS or FD Condulet Cast Device Boxes (# gangs as required).

C. Matching iron alloy (Feraloy) covers as required for device(s) used.

D. All outlets/boxes, and fittings in Class I, Division 1, Group D, or Class I, Division 2, Group D areas shall be listed for use in those respective areas as noted on drawings.

E. Outlets/boxes, and fittings in Classified Locations shall be listed for use in the respective areas.

PART 3 EXECUTION

3.01 INSTALLATION

A. Avoid potential obstructions within dedicated equipment spaces and work clearances as defined in the NEC.

B. Clean interior of boxes to remove dirt, debris, and other foreign materials.

C. Do not use sectional or handy boxes.

D. Protect outlet boxes from entrance of foreign materials, including paint.

E. Surface mount interior outlet boxes.

F. Provide seal offs per NEC Articles 500 and 501 as required.

G. Install outlets at the heights and approximate designated positions as shown on the Drawings unless specifically noted otherwise.

H. Locate outlets to clear piping, access hatches, and other obstructions.

I. Install switch outlets on latch side of door except where type of construction dictates otherwise.

J. Mounting heights indicated on Drawings are to center line of outlet unless indicated otherwise.

K. Pull boxes and junction boxes are not indicated on Drawings except for special requirements. Install pull boxes or junction boxes as required to facilitate pulling wire. Size pull boxes and junction boxes as required by the National Electrical Code.

L. Mount receptacles in the equipment rooms and in other unfinished areas at 48 inches unless noted otherwise. Match mounting heights of similar existing devices in the immediate area if present.

M. conduits entering pull boxes shall have the conduit ID as shown on the cable and conduit schedule clearly labeled on the inside of the pull box using permanent marker.

N. Provide ventilated skirt under junction boxes where indicated.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Identification includes panelboards, disconnects, transformers, relays, contactors, system control panels, variable frequency drives, separately mounted control stations, pilot lights, control switches, wires, and terminations.

1.02 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code (NEC).

B. OSHA

PART 2 PRODUCTS

2.01 INSTRUCTION SIGNS

A. Plastic sandwich-type acrylic based construction of contrasting colors, Rowmark. Engraving through the top layer exposes inner layer.

B. Color: Black with white letters.

C. Letters: 1/8" height, standard block type.

D. Punched or drilled for mechanical fasteners. Fasteners shall be self-tapping stainless-steel screws with nuts and flat lock washers.

2.02 EQUIPMENT IDENTIFICATION LABELS

A. Self-adhered, engraved, laminated acrylic or melamine label.

B. Color: Black with white letters.

C. Letters: 3/8-inch minimum height, standard block type.

D. Punched or drilled for mechanical fasteners. Fasteners shall be self-tapping stainless-steel screws with nuts and flat lock washers.

2.03 WIRE MARKERS

A. Wires requiring circuit indication shall be permanently fastened type written. Handwritten labels shall not be acceptable.

B. Wire markers shall be Shrink Tube or Self Laminating type.

C. Shrink Tubing type wire markers:

1. Shrink tube type markers shall be type written with circuit indication.
2. 3:1 heat-shrinking type
3. Resistant to chemicals, grease, oil and cleaning agents.
4. Material shall be Polyolefin with smudge-proof finish.
5. Material shall be cold resistant and flame-retardant
6. Temperature range: -67 to 275 degrees Fahrenheit.
7. Manufacturer: Brady

D. Self-laminating type wire markers:

1. Self-laminating type markers shall be type written with circuit indication
2. Vinyl label with acrylic adhesive
3. Label shall have overlaminate included sized appropriately to wrap cable one and a half times or completely cover printed area, whichever is greater.
4. Label shall be rated for indoor and outdoor use.
5. Temperature range: -94 to 140 degrees Fahrenheit.
6. Material shall be flame-retardant.
7. Resistant to chemicals, humidity, oil, water and weather.
8. Manufacturer: Brady

2.04 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and OSHA 29 CFR 1910.145.

B. Self-adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated. Weather resistant, non-fading, metal backed or baked enamel signs shall be used for outdoor installations.

2.05 POWER SOURCE LABELS FOR EQUIPMENT AND DEVICES

A. Self-adhered label, installed on the front cover, door, or other access to equipment and devices unless otherwise indicated. Weather resistant, non-fading, metal backed or baked enamel signs to be used for outdoor installations.

B. Manufacturer: Brady or.

C. Apply to panels, junction boxes, receptacle faceplates, switch faceplates, front covers, doors, or other access to equipment unless otherwise indicated.

2.06 CABLE AND CONDUIT IDENTIFICATION

A. Cable or conduit shall be identified using a permanent identification system consisting of a round 304 stainless steel engraved tag secured to the cable or conduit 6" from entry at both ends. Install tag in suitable location readable from normally accessed side.

B. The following information shall be provided on each conduit label:

1. Line #1 - Conduit ID found on the Cable and Conduit Schedule (where applicable)
2. Line #2: From: XXX (if a Cable and Conduit ID is not available)
3. Line #3: To:XXX (if a Cable and Conduit ID is not available)

PART 3 EXECUTION

3.01 INSTALLATION

A. Clean surface before installation of self-adhered labels.

B. Identify with black acrylic based placard with white engraved letters mounted with drive pins or other approved fasteners.

3.02 DISCONNECTS AND STARTER ENCLOSURES

A. Use the following for identifying disconnects or starter enclosures per NEC 110.22 (A).

1. EXAMPLE: Raw Wastewater Pump #1
   480 volt, 3 phase, 300 H.P.
   Fed from: DP-X, Pole Position XX

3.03 SWITCHBOARDS, MCC & PANELBOARD LABELING

A. Label per NEC Article 408.4 (A) & (B) and with the following information: Panel name, voltage, phase and amperage/type of main.

1. EXAMPLE:
   Panel L: Fed From: DP-X
   120/208 volt
   Three phase
   225 amp Main Circuit Breaker

B. Provide each panelboard with a typed directory, with clear plastic cover, of circuits describing loads served.

C. Markings shall be plainly visible, fit over the insulation of the conductor and begin 1/8” from where the insulation begins.

D. Wire markers shall be placed on both ends of wires prior to termination.

E. Wiring shall be checked for circuit completeness to verify correct circuiting, identification and labeling at the terminals. Terminal markings and wire markings shall match record schematics.

F. Hand lettering of identification not permitted. Completely remove temporary labels used during construction and repaint surfaces if required.

3.04 POWER SOURCE LABELS FOR EQUIPMENT AND DEVICES

A. Provide a mechanically fastened power source label at equipment and devices with the following information:

1. EXAMPLE: LPA-11 or LPA-13,15 or DPA-1,3,5.

B. Equipment and devices such as panels, junction boxes, receptacle faceplates, switch faceplates, front covers, doors, or other access to equipment shall include an adhesive backed label that indicates the power source.

3.05 CONDUIT AND CIRCUIT LABELING AT POINT OF ENTRY TO LARGE ENCLOSURES

A. Use a black permanent marker to hand label conduits and circuits at the point of entry to large enclosures (control panels, pullboxes, junction boxes, motor control centers, etc.) with the conduit/circuit number from the cable and conduit schedule.

B. Labeling shall be on the interior of the enclosure or on the floor near each conduit/circuit, or on the conduit. Conduits/circuits that enter enclosures shall be labeled.

C. Labeling with a permanent marker shall be in addition to circuit tags installed around the cables themselves.

3.06 GROUNDED (NEUTRAL) CONDUCTOR IDENTIFICATION

A. Identify grounded conductors in accordance with NEC 200.6.

B. In addition to the part (D) identification requirements for the grounded conductor when different systems are in close proximity - Example: Non-Emergency UPS and Utility power sharing a common junction box or multi-channel raceway. Where broken, to prevent crossing of grounded/neutral conductors, the non-utility system's neutral wires shall have wire markers identifying it as the system to which it belongs.

3.07 DRY TYPE TRANSFORMER

A. Label per NEC Article 450.11 and with the following information: Transformer name, power source and circuit number, and loads served.

1. Example: XFMR-1
Fed from: DP-X-12,14,16
Feeds LP-X

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Furnish and install all wiring devices and device plates where shown on the Drawings.

1.02 WORK INSTALLED BUT FURNISHED BY OTHERS

A. Where indicated, install devices supplied by Division 1 through 40.

1.03 QUALITY ASSURANCE

A. NEMA

B. U.L. Listed

C. NFPA 70 - National Electrical Code, current adopted Edition

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with Specification Section 01 33 00 - Submittal Procedures. Clearly indicate device type, voltage, amperage, NEMA configuration, color.

1.05 DELIVERY, STORAGE AND HANDLING

A. Store in a dry area, protected from the weather.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit in accordance with Specification Section 01 78 23 - Operation and Maintenance Data, a list of all devices used, including manufacturer and type.

PART 2 PRODUCTS

2.01 DUPLEX RECEPTACLES: (SURFACE MOUNTED IN FINISHED AREAS)

A. Manufacturer: Equal to Hubbell #5352 Series, Bryant #5352, Leviton #5352, P&S CR Series, or P&S #5362 Series duplex.

B. Type:

1. Specification grade
2. Gray in color (normal applications); Blue for UPS applications.

3. 20 Ampere
4. 120 Volt
5. 3 Wire Grounding

2.02 GROUND FAULT RECEPTACLE

A. Manufacturer: Equal to P&S 1597 Series, Eaton SGF15, Leviton:

1. 15 A Capacity
2. Gray
3. 120 Volt with 5 milliampere trip

B. Manufacturer: Equal to P&S 2097 Series, Eaton SGF20, Leviton:

1. 20 A Capacity
2. Gray
3. 120 Volt with 5 milliampere trip

C. Other Manufacturers and models must be approved by Engineer

2.03 DEVICE PLATES

A. Provide device wall plates per Specification Section 26 05 37 - Boxes and as required by NEC.

2.04 WEATHERPROOF COVERS

A. Provide weatherproof device covers on all exterior devices, wet area devices, chemical room devices and in other areas indicated on the Drawings and as required by the NEC.

B. Unless indicated otherwise, covers shall be of the “weather protected while in use” variety and shall consist of the following:

1. Exterior Applications: cast aluminum, lockable, sized as required for the application. Manufacturer/Model: Intermatic / Type #WP10, or equal.
2. Wet, Chemical or Caustic Interior Areas: clear plastic or PVC construction, Carlon, Intermatic WP5100 Series, or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install devices and device plates where shown on the Drawings.

B. All receptacles and switches listed within this section shall be installed with the ground side down.

C. Provide blank plates for unused openings.

D. See Section 26 05 53 - Identification for Electrical Systems for engraving requirements for pilot lights and pilot lighted switches.

3.02 CLEANING

A. Clean exposed surfaces to remove dirt, paint, and other foreign material and restore to match original factory finish.

3.03 PROTECTION

A. Protect installed products from subsequent construction operations.

END OF SECTION

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SECTION 26 28 13
FUSES

PART 1 GENERAL

1.01 SUMMARY

A. Fuses for fuse holders except where equipment is noted "spare".

1.02 QUALITY ASSURANCE

A. UL listed

1.03 DELIVERY, STORAGE AND HANDLING

A. Store in a dry area, protected from the weather.

PART 2 PRODUCTS

2.01 FUSES

A. Manufacturer: Bussman Manufacturing, Gould/Shawmut.

B. 600 amperes and larger, Class L

1. Buss KRP-C or Gould A4BQ.

C. Less than 600 amperes, Class J

1. Buss LPJ or Gould AJT

D. Motor branch circuit protection, less than 600 amperes, Class J, with time delay characteristics

1. Buss LPJ or Gould AJT

E. Selectivity

1. Where indicated, furnish products as required to achieve selective coordination.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide fuses for fuse holders in equipment.

B. Install fuses with label oriented outward such that manufacturer, type, and size are easily read.

C. Supply to the Owner one spare fuse for each fuse installed of 400 ampere or larger rating.

D. Supply to the Owner, below 400 ampere, one spare fuse for each three fuses of each ampere and class rating installed with a minimum of three spares for each ampere rating and class rating used.

END OF SECTION

DIVISION 31
EARTHWORK

SECTION 31 05 13
SOILS FOR EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Subsoil materials.
2. Topsoil materials.

B. Related Sections include:

1. Section 01 33 00 – Submittal Procedures.
2. Section 01 45 00 – Quality Control.
3. Section 31 14 13 – Soil Stripping and Stockpiling.
4. Section 31 23 16 – Excavation.
5. Section 32 90 00 – Landscape Grading.
6. Section 32 92 19 – Seeding.
7. Section 32 97 00 – Restoration of Disturbed Areas.
8. Section 33 10 00 – Water Utilities.

1.02 REFERENCES

A. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

B. ASTM D2487 - Classification of Soils for Engineering Purposes.

C. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

D. ASTM D6938 - Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.03 SUBMITTALS FOR REVIEW

A. See Section 01 33 00 - Submittal Procedures.

B. Samples: Submit, in air-tight containers, 10 pound sample of each type of fill to testing laboratory.

1.04 QUALITY ASSURANCE

A. Section 01 45 00 - Quality Control: Field Samples.

B. Material Source: Submit name of imported material supplier(s). Provide materials from the same source throughout the Work. Change of source requires Engineer approval.

PART 2 PRODUCTS

2.01 SUBSOIL MATERIALS

A. Subsoil: Excavated material; Imported borrow, and select or local borrow. All subsoil shall be graded free of lumps larger than 3 inches in any dimension; graded free of gravel or rocks larger than 2 inches in any dimension; and free of debris, waste, frozen materials, vegetation and other deleterious material.

1. Type S1: Fine sand and gravel, including fine sands, sand-clay mixtures, and gravel-clay mixtures. Conforming to ASTM D2487 Group Symbol GM, GC, SM, and SC.
2. Type S2: Silt, silty-clay, inorganic clays, and silts of medium to high plasticity and a maximum liquid limit of 40. Conforming to ASTM D2487 Group Symbol CL, ML, CH, and MH.
3. Type S3: Non-used; All frozen material, vegetation, trash, rocks, and concrete and bituminous chunks having a dimension exceeding 3 inches.
4. Unsuitable soils: All frozen material, vegetation, trash, rocks, and concrete and bituminous chunks having a dimension exceeding 3 inches and otherwise not meeting the specifications of soil materials.

2.02 TOPSOIL MATERIALS

A. Topsoil: Excavated material; Graded free of roots, rocks larger than ¾ inches, subsoil, debris, large weeds, and foreign matter.

1. Type S4: Imported or Re-used; Friable loam. Acidity range (pH) of 5.5 to 7.5 containing a minimum of 4 percent and a maximum of 25 percent organic matter. Conforming to ASTM D2487 Group Symbol OL and OH.

2.03 SOURCE QUALITY CONTROL

A. Section 01 45 00 - Quality Control: Testing and analysis of soil material.

B. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D698 and ASTM D6938.

C. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D2487.

D. If tests indicate materials do not meet specified requirements, change material and retest.

E. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 SOIL REMOVAL

A. Excavate topsoil and subsoil required from all areas designated for construction per Section 31 14 13 and per Section 31 23 16 respectively

B. Remove lumped soil, boulders, rock, debris, tree stumps and roots, and large weeds.

C. Stockpile excavated material in area acceptable to Owner and remove excess material not being used, from site.

3.02 STOCKPILING

A. Stockpile materials in an area acceptable to Owner.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Prevent intermixing of soil types or contamination of stockpiled soils.

E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.03 STOCKPILE CLEANUP

A. Remove stockpile; leave area in a clean and neat condition. Grade site surface to prevent freestanding surface water.

B. If a borrow area is indicated, leave area in a clean and neat condition. Grade site surface to prevent freestanding surface water.

END OF SECTION

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SECTION 31 05 16
AGGREGATES FOR EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Coarse and fine aggregate materials.
2. Source quality control.
3. Aggregate stockpiling and stockpile cleanup.

B. Related Sections include, but are not limited to:

1. Section 01 22 00 – Unit Price Measurement and Payment.
2. Section 01 33 00 - Submittal Procedures
3. Section 01 45 00 – Quality Control.
4. Section 31 05 13 – Soils for Earthwork.
5. Section 31 23 23 – Fill and Backfill.
6. Section 32 90 00 – Landscape Grading
7. Section 33 10 00 – Water Utilities.

1.02 REFERENCES

A. Reference Standards include:

1. ASTM C33/C33M – Standard Specification for Concrete Aggregates.
2. ASTM C136/C136M – Method for Sieve Analysis of Fine and Coarse Aggregates.
3. AASHTO T 180 – Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
4. ASTM D2487 – Classification of Soils for Engineering Purposes.
5. ASTM D6938 - Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D4318 – Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
7. Standard Specifications for Road and Bridge Construction, Latest Edition, by North Dakota Department of Transportation.

1.03 SUBMITTALS FOR REVIEW

A. Section 01 33 00 - Submittals: Procedures for submittals.

B. Samples: Submit, in air-tight containers, 10 pound sample of each type of fill to testing laboratory.

1.04 QUALITY ASSURANCE

A. Section 01 45 00 - Quality Control: Field Samples.

B. Material Source: Submit name of imported material supplier(s). Provide materials from the same source throughout the Work. Change of source requires Engineer approval.

PART 2 PRODUCTS

2.01 COARSE AGGREGATE MATERIALS

A. Coarse Aggregate Type A1: Well graded crushed stone or gravel conforming to the requirements of ASTM C33/C33M, Gradation 67.

B. Coarse Aggregate Type A2 (Aggregate Surface): Gravel; Angular crushed or natural stone; free of shale, clay, friable material and debris; graded in accordance with North Dakota Department of Transportation referenced specifications, Section 816, Class 13.

C. Coarse Aggregate Type A3 (Aggregate Base): Gravel; Angular crushed or natural stone; free of shale, clay, friable material and debris; graded in accordance with North Dakota Department of Transportation referenced specifications, Section 816, Class 5.

D. Coarse Aggregate A4 (Drainage Fill): Uniform, poorly graded natural or crushed stone meeting the gradation requirements of the ND DOT specification section 816, Class 2.

E. ND Class 3 Modified Backfill (Pipe Bedding): Gravel; free of shale, clay, friable material and debris; graded in accordance with North Dakota Department of Transportation referenced specifications, Section 816, Class 3 with the number 200 sieve requirement modified to be 3-15% passing.

2.02 FINE AGGREGATE MATERIALS

A. Fine Aggregate Type A5 (Sand): Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter; graded in accordance with ASTM C33/C33M; within the following limits:

2.03 SOURCE QUALITY CONTROL

A. Section 01 45 00 - Quality Control: Source testing and analysis of aggregate material.

B. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM C136 and ASTM D698.

C. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM C136 and ASTM D698.

D. If tests indicate materials do not meet specified requirements, change material or material source and retest.

E. Provide materials of each type of aggregate from the same source throughout the Work.

PART 3 EXECUTION

3.01 STOCKPILING

A. Stockpile materials in accordance with Section 31 14 13.

3.02 STOCKPILE CLEANUP

A. Cleanup stockpiles in accordance with Section 31 14 13.

END OF SECTION

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SECTION 31 11 00
CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Protection of features not designated for removal.
2. Site removals.
3. Disposal of waste materials.

B. Related Sections include:

1. Section 31 14 13 – Soil Stripping and Stockpiling.
2. Section 31 23 16 – Excavation.
3. Section 31 23 23 – Fill and Backfill.
4. Section 31 25 00 – Erosion and Sedimentation Control.
5. Section 32 90 00 – Landscape Grading.
6. Section 32 92 19 – Seeding.
7. Section 32 97 00 – Restoration of Disturbed Areas.

1.02 REGULATORY REQUIREMENTS

A. Conform to applicable codes and regulations for proper disposal of debris.

B. Conform to applicable codes for worker safety.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil: Refer to Section 31 14 13.

B. Materials such as trees, vegetation, debris, trash and all other material identified by the Owner as unsuitable shall become Contractor's property and shall be removed from the site to a disposal area furnished by the Contractor that is acceptable to local authorities and regulatory agencies. Burning of unsuitable material shall not be allowed on Owner's property.

PART 3 EXECUTION

3.01 PREPARATION

A. Provide, erect, and maintain adequate barriers, fences, and signs.

B. Verify that existing plant life designated to remain is tagged or identified.

C. Beginning work of this Section means acceptance of existing conditions.

D. Identify and furnish an area for storing or placing removed material prior to the commencement of Work in this Section.

E. Conform to all applicable regulations for proper disposal of debris.

3.02 PROTECTION

A. Locate, identify, and protect utilities that are not designated for removal from damage.

B. Protect trees, plant growth, and features designated to remain, as final landscaping.

C. Protect bench marks, survey control points, and existing structures from damage.

D. Prevent surface water and subsurface or groundwater from entering excavations, from ponding on prepared subgrades and from flooding site and surrounding area.

E. Contractor shall repair or replace, to original condition or better, existing structures and improvements, trees, shrubs, and landscaping damaged or injured during construction operations. Contractor shall understand the sensitive nature of working on or near developed property and shall endeavor to limit injury or damage both inside the limits of construction and outside the limits of construction.

F. Protect existing trees and other vegetation indicated to remain from unnecessary cutting, breaking, skinning of roots, skinning and bruising of bark, smothering of trees, by stockpiling construction materials or excavated materials within the drip line, excess foot of vehicular traffic, or parking of vehicles within drip line.

G. Protect wetlands, rivers, streams, and other waters of the state from all construction activities and contamination by erosion and runoff.

H. Protect areas that have been finish graded from subsequent construction operations, traffic, and erosion. Remove, provide new, and compact as required, material contaminated by erosion and runoff

I. Confine Work effort to within Construction Limits shown on the Drawings. Leave undisturbed all appurtenances not indicated for removal or renovation.

3.03 CLEARING

A. Clear areas required for access to site and execution of Work. Stay within easement and right-of-way at all times without prior written approval from property owner and Engineer.

3.04 GRUBBING

A. Depressions resulting from grubbing operations shall be backfilled in accordance with other sections in Division 31.

3.05 DISPOSAL OF WASTE MATERIALS

A. Remove all clearing and grubbing debris from the site

B. Adhere to all permits and regulations. Burning shall not be allowed on Owner's property or project site.

END OF SECTION

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SECTION 31 14 13
SOIL STRIPPING AND STOCKPILING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Protection of features not designated for removal.
2. Topsoil Removal.
3. Stockpiling of Materials.
4. Stockpile Cleanup.

B. Related Sections include:

1. Section 31 11 00 – Clearing and Grubbing.
2. Section 31 23 16 – Excavation.
3. Section 31 23 23 – Fill and Backfill.
4. Section 31 25 00 – Erosion and Sedimentation Control.
5. Section 32 90 00 – Landscape Grading.
6. Section 32 92 19 – Seeding.
7. Section 32 97 00 – Restoration of Disturbed Areas.
8. Section 33 10 00 – Water Utilities.

1.02 DESCRIPTION

A. Excavation shall not be allowed outside of the limits of construction where shown on the Drawings.

B. Materials may be temporarily stockpiled on the site within the limits of construction or where shown on the Drawings.

C. Protect benchmarks and existing structures that are to remain from damage or displacement.

1.03 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the Work are as indicated.

1.04 DEFINITIONS

A. Soil Testing Laboratory: Refers to a professional soils engineering firm with soil sampling and testing services that is independent from the Contractor.

B. Structures: Existing and new construction, including slabs, buildings, footings, tanks, and other structural elements.

1.05 SITE CONDITIONS

A. Contractor shall determine to Contractor's own satisfaction the nature and location of subsurface obstacles and the nature of soil and water conditions which will be encountered during the work.

B. Contractor may perform test borings or other exploratory operations at Contractor's own expense. Contractor shall make arrangements for any soils investigation with Owner.

C. No claim for additional payment will be accepted due to the nature of subsurface conditions in which the work is to be performed.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.01 INSPECTION

A. Contractor shall verify which native materials are suitable for reuse at the site. Provide testing data as required and keep materials separated.

B. Notify Engineer of any unsuitable materials.

3.02 PROTECTION OF FEATURES NOT DESIGNATED FOR REMOVAL

A. Protect all existing structures, trees, plantings, turf, and other facilities which are not scheduled for removal.

3.03 TOPSOIL REMOVAL FOR STRUCTURES

A. Remove sod and grass and then excavate full depth of topsoil from areas to be further excavated, re-landscaped, or re-graded without mixing with foreign materials.

B. All topsoil shall be stripped to full depth (12 inches minimum) and stockpiled separately in area of site designated by Construction Manager. Topsoil will be available for replacement on top of finished grading and all disturbed areas not covered by structures or pavement.

C. Separate all debris, large roots, and rocks greater than one (1) inch from the topsoil and remove from the site to Contractor furnished off-site disposal area.

D. Do not excavate wet topsoil.

E. Where trees are to be left standing, stop topsoil stripping a sufficient distance (at least the drip line) from a tree to prevent damage to main root system.

F. Excavated topsoil shall remain on Owner's property. Remove all excavated topsoil to on site stockpile area designated by Construction Manager and stockpile to a depth not exceeding 8 feet and protect from erosion.

3.04 TOPSOIL EXCAVATION -- PIPELINE INSTALLATION

A. Strip existing topsoil full depth or a maximum of 12 inches.

B. If installation of pipeline by

1. Trencher method: topsoil must be stripped a minimum width of 40 feet, excavated subsoil material may not be placed on non-stripped top soil.
2. Excavator method: topsoil must be stripped a minimum width of 40 feet, and excavated subsoil material may not be placed on non-stripped topsoil, but must be placed on stripped surfaces.
3. Plow method: no topsoil stripping is required

C. Do not excavate wet topsoil. Wet topsoil is defined as wetter than the plastic limit.

D. Stockpile in area on site to depth not exceeding 8 feet and protect from erosion.

E. Remove excess topsoil not intended for reuse from site to a new location acceptable to Owner.

3.05 STOCKPILING OF MATERIALS

A. Contractor may temporarily stockpile acceptable materials including topsoil, excess excavated, and delivered materials within the limits of construction where shown on the Drawings. Contractor shall obtain approval from Engineer before stockpiling excess materials.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

E. Apply appropriate erosion control measures to stockpile areas.

F. Contractor shall remove all excess stockpiles from the site prior to substantial completion of the project.

3.06 STOCKPILE CLEANUP

A. Remove stockpile; leave area in a clean and neat condition. Grade site surface to prevent freestanding surface water.

B. If a borrow area is indicated, leave area in a clean and neat condition. Grade site surface to prevent freestanding surface water.

C. Restore stockpile area in accordance with Section 32 97 00.

END OF SECTION

SECTION 31 23 16
EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Preparation.
2. Excavation for pipeline trenches and related appurtenances.
3. Excavation for pipe boring pits, site structures, and utilities.
4. Field quality control.
5. Protection.

B. Related Sections:

1. Section 01 45 00 – Quality Control.
2. Section 01 50 00 – Temporary Facilities and Controls.
3. Section 31 05 13 – Soils for Earthwork.
4. Section 31 05 16 – Aggregates for Earthwork.
5. Section 31 11 00 – Clearing and Grubbing
6. Section 31 14 13 – Soil Stripping and Stockpiling.
7. Section 31 23 19 – Dewatering.
8. Section 31 23 23 – Fill and Backfill.
9. Section 31 25 00 – Erosion and Sedimentation Control.
10. Section 32 90 00 – Landscape Grading.
11. Section 32 97 00 – Restoration of Disturbed Areas.
12. Section 33 10 00 – Water Utilities.

1.02 GENERAL REQUIREMENTS

A. With reference to the terms and conditions of the construction standards for excavations set forth in the Occupational Safety and Health Authority (OSHA) “Safety and Health Regulations for Construction”, Chapter XVII of Title 29, CFR, Part 1926, employ a competent person and, when necessary, a registered professional engineer, to act upon all pertinent matters of the Work of this section.

B. Excavations shall provide adequate working space and clearances for the Work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.

C. Subgrade surfaces shall be clean and free of loose material of any kind when pipelines and appurtenances are placed thereon.

D. Verify that survey benchmarks, control points, pipeline alignment stakes, and intended elevations for the Work are as indicated on the Drawings.

E. Verify Work associated with lower elevation pipelines and/or utilities is complete before placing higher elevation pipelines or utilities.

F. Rock issues in areas of the pipeline construction may be prevalent in the subsurface and/or on the surface. Contractor is responsible for removal of the rocks in the staked route and in the pipe trench.

PART 2 PRODUCTS

2.01 NOT USED.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine project site and conditions under which work of this Section is to be performed.

B. Contractor shall verify which native materials are suitable for reuse at the site. Provide testing data as required and keep materials separated.

C. Notify Engineer of any unsuitable materials.

D. Do not over excavate without authorization from Engineer.

3.02 PREPARATION

A. Locate, identify, support, and protect above and below ground utilities that are to remain from damage.

B. Notify and coordinate with all utility owners for location of buried utilities per State and local utility locate requirements prior to performing any excavation activities. Contractor shall be responsible for all utility locate inquiries and shall be responsible for all damages to utilities due to lack of locate inquiry and coordination.

C. Identify required pipeline routes, lines, levels, contours, and datum locations.

D. Identify and protect plant life, lawns, and other features to remain during construction or as a component of final landscaping.

E. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating and construction equipment and vehicular traffic.

F. Cut out soft areas of subgrade not capable of compaction in-place or suitable for pipeline or appurtenance installation. Backfill with Type S1 or S2 fill, as outlined in Section 31 05 13, and compact to density equal to or greater than requirements for subsequent backfill material.

3.03 EXCAVATING

A. Excavate and stockpile topsoil in accordance with Section 31 14 13.

B. Excavate subsoil required for installation of pipelines and appurtenances to required trench depths and widths.

C. When using hydraulic excavators for pipeline installation, excavate trenches sufficiently wide to enable safe pipeline and appurtenance installation and allow safe inspection.

D. Excavate subsoil to accommodate pipeline boring operations, manholes, site structures, construction operations, and other Work.

E. Slope excavation walls with hydraulic excavator per OSHA excavation and access requirements for given soil type. If shoring is proposed for excavation(s), design, install, operate, and maintain shoring system per OSHA shoring and access requirements. Contractor shall be responsible for all shoring system design requirements.

F. Stockpile excavated material in an area on site a suitable distance from excavation to not adversely affect stability of excavation wall(s) and to prevent slides and cave-ins. Refer to Section 31 14 13 for additional stockpiling requirements.

G. Control groundwater within excavations per requirements of Section 31 23 19.

H. Remove lumped subsoil larger than 3-inches in any dimension, boulders, and rock up larger than 2-inches in any dimension. These subsoil conditions are not allowed for fill or backfill of the pipeline trench.

I. Grade top perimeter of excavation to prevent surface water from draining into excavation. Water shall not be permitted to accumulate in the excavation.

J. Do not excavate materials that interfere with 45 degree bearing splay of foundations or roadways.

K. Underpin adjacent structures and/or roadways that may be damaged by excavating Work.

L. Hand trim excavations to protect workers below as required. Remove loose matter.

M. Support and protect existing utilities within excavation limits intended to remain in service.

N. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume Work.

O. Compact disturbed load bearing soil in direct contact with Work to original bearing capacity; perform compaction in accordance with Section 31 23 23.

P. Remove excess or unsuitable material from Site. Bear all costs for removal, hauling, and/or spreading of excess fill.

Q. Backfill and compact excavated and over-excavated areas in accordance with Section 31 23 23 and 32 90 00.

3.04 FIELD QUALITY CONTROL

A. Provide for visual inspection of bearing surfaces.

B. Submit for Engineer's approval prior to construction, information on Contractor proposed grade control method and equipment including, but not limited to, equipment operation, accuracy, and capabilities to record and verify Grade Control.

1. Pipeline installation shall be installed with a maximum vertical tolerance of +/- 0.20’ for open-cut and bored pipeline
2. Pipeline installation shall be installed with a maximum horizontal tolerance of +/- 2.00’ for open-cut and bored pipeline.

C. Provide testing services per the requirements of Section 01 45 00.

D. Provide backfill and soil compaction testing per Section 31 23 23.

3.05 PROTECTION

A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations, adjacent soils, and stockpiled soils intended for backfilling operations from freezing.

C. Comply with all OSHA requirements.

END OF SECTION

SECTION 31 23 19
DEWATERING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Provision and maintenance of an adequate dewatering system to remove and dispose of all surface and groundwater entering the excavation, trenches, and other parts of the Work.

B. Related Sections:

1. The General Conditions and General Requirements apply to work of this section.
2. Section 01 45 00 – Quality Control.
3. Section 01 50 00 – Temporary Facilities and Controls.
4. Section 31 05 13 – Soils for Earthwork.
5. Section 31 05 16 – Aggregates for Earthwork.
6. Section 31 11 00 – Clearing and Grubbing
7. Section 31 14 13 – Soil Stripping and Stockpiling.
8. Section 31 23 23 – Fill and Backfill.
9. Section 31 25 00 – Erosion and Sedimentation Control.
10. Section 32 90 00 – Landscape Grading.
11. Section 32 97 00 – Restoration of Disturbed Areas.
12. Section 33 10 00 – Water Utilities.

1.02 PERMITS AND LICENSES

A. The Contractor shall be responsible for obtaining all necessary permits as related to dewatering and water discharge and to comply with all stipulations of such permits.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.01 GENERAL

A. Each excavation shall be kept dry during the course of all work herein, including subgrade preparation, pipe installation, and backfilling, to the extent that no damage from hydrostatic pressure, flotation, or other damage results. All

excavations shall be dewatered to a depth of at least two (2) foot below the bottom of the exposed surface, the concrete base, or pipe to be installed herein.

B. The Contractor may use any method or combination of methods for dewatering, provided that those methods are consistent with all other provisions contained in the Specifications; however, all dewatering methods and equipment, which, in the opinion of the Engineer, are ineffective at either dewatering the site or treating dewatering discharge, shall be abandoned, improved, replaced or otherwise altered to obtain effective dewatering.

C. The Contractor shall provide all power, pumps, materials, and equipment necessary, and shall be responsible for disposing of the water pumped from the excavation in a manner, which will not interfere with other Work within the area and will not damage public or private property. The Contractor will be held responsible for the condition of any pipe, conduit, ditch, channel or natural watercourse utilized for drainage purposes. All erosion, sediment or other adverse results of its use shall be repaired at Contractor's expense.

D. Contractor shall provide suitable means of standby power to keep dewatering system fully operational.

E. All costs for dewatering shall be incidental to the Project and be borne by the Contractor.

3.02 CORRECTIVE ACTION

A. The Contractor shall be responsible for, and shall repair without cost to the Owner, any damage to work in place, other contractors' equipment, and the excavation, including damage to the bottom due to heave and including removal of material and pumping out of the excavated area that may result from Contractor's negligence, inadequate or improper design and operation of the dewatering system, and any mechanical or electrical failure of the dewatering system.

B. Contractor shall install appropriate best management erosion control measures and maintain them as required.

3.03 WATER QUALITY CONTROL

A. All points of concentrated dewatering discharge shall be visually inspected daily by the Contractor to determine that any sediment draining out of the construction site is consistent with all applicable permits and regulations.

3.04 REMOVAL

A. Prior to removal of the system, ensure compliance with regulatory permits.

B. Any wells shall be plugged in accordance with all applicable regulations.

C. Shut off dewatering system at such a rate to prevent quick upsurge of water, which may weather underlying subgrade or surrounding soil.

END OF SECTION

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SECTION 31 23 23
FILL AND BACKFILL

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Scarifying, compacting and shaping the earth subgrade below pavements and structures.
2. Backfilling and compaction for:
   a. Pipeline trenches.
   b. Pipeline bore pits or user connection pits.
   c. Cast-in-place structures and manholes.
   d. Hydrants, valve boxes, and other appurtenances.
   e. Fill under landscaped areas.
   f. Fill under paved areas.
   g. Fill in cultivated areas.
   h. Fill for over-excavation.

B. Related Sections include, but are not limited to:

1. Section 01 45 00 – Quality Control.
2. Section 01 50 00 – Temporary Facilities and Controls.
3. Section 31 05 13 – Soils for Earthwork.
4. Section 31 05 16 – Aggregates for Earthwork.
5. Section 31 11 00 – Clearing and Grubbing
6. Section 31 14 13 – Soil Stripping and Stockpiling.
7. Section 31 23 16 – Excavation.
8. Section 31 23 19 – Dewatering.
9. Section 31 25 00 – Erosion and Sedimentation Control.
10. Section 32 90 00 – Landscape Grading.
11. Section 32 97 00 – Restoration of Disturbed Areas.
12. Section 33 10 00 – Water Utilities.

1.02 REFERENCES

A. Reference Standards Include:

1. ASTM C136/C136M - Method for Sieve Analysis of Fine and Coarse Aggregates.
2. AASHTO T 180 - Test Methods for Moisture - Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
3. ASTM D698 Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).

4. ASTM D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).
5. ASTM D6938 - Test Methods for In-Place Density and Water Content of Soil and Soil - Aggregate in Place by Nuclear Methods (Shallow Depth).
6. Standard Specifications for Road and Bridge Construction, Latest Edition, by North Dakota Department of Transportation.

1.03 QUALITY ASSURANCE

A. Section 01 45 00 - Quality Control: Field Samples.

B. Material Source: Submit name of imported material supplier(s). Provide materials from the same source throughout the Work. Change of source requires Engineer approval.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. Topsoil and Subsoil Fills: As specified in Sections 31 05 13.

B. Aggregate Fills: As specified in Section 31 05 16.

2.02 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to approval of the Engineer.

PART 3 EXECUTION

3.01 EXAMINATION

A.

B. Verify sub-drainage, damp proofing or waterproofing, and insulation installation has been inspected.

C. Verify subgrade preparation consists of a firm and stable subgrade prior to placement of the surface or base course.

D. Verify that below-grade cast-in-place concrete structures have cured to 75 percent of their design compressive strength before placing backfill against walls. Provide additional internal structural support to accommodate differential backfill placement per Engineer requirements.

E. Verify valve blocking, required poly wrap, restraints, couplings, valve boxes, and thrust blocking are in-place, complete, and have been inspected and documented as to location and configuration for record drawing purposes.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Notify utility company to locate utilities.

C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

D. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Remove all subsoil lumps larger than 3-inches in any dimension and rocks larger than 2-inches in any dimension from pipe trench backfill pile and area. These subsoil conditions are not allowed for fill or backfill of the pipe trench.

F. All subgrades below structures shall be cut to the final depth with a smooth-edged backhoe or other equipment that will minimize disturbance to the subgrades.

G. Subgrade shall be prepared by scarifying the upper 12-inches of subgrade soil. Subgrade preparation shall extend deeper than 12-inches if the Engineer determines that additional subgrade preparation is necessary to support construction.

H. Compact subgrade to density requirements for subsequent backfill materials, as specified in this Section.

1. Identify soft spots and remove soft areas of subgrade not capable of compaction in-place. Backfill with Type S1 or Type S2 fill, as specified in Section 31 05 13, and compact to density equal to or greater than requirements for subsequent fill material.
2. Contractor shall be responsible for drying the subgrade soil or applying water as may be necessary to obtain the required density. Contractor shall also be responsible for grading the Work area and providing drainage so that accumulating water will drain away from the subgrade.

3.03 STOCKPILING OF MATERIALS

A. Stockpile according to Section 31 14 13.

3.04 BACKFILLING AND COMPACTION

A. Backfill and compact areas to existing contours and elevations with unfrozen materials. Follow natural ground contours in cultivated areas, ditches, and landscaped areas. Make gradual grade changes. Blend slope into level areas.

B. Systematically backfill and compact to allow maximum time for natural settlement. Do not backfill over loose, porous, wet, frozen, or spongy subgrade surfaces.

C. Aggregate Fill: Place and compact materials in equal continuous layer not exceeding 6 inches compacted depth.

D. Soil Fill: Place and compact material in equal continuous layers not exceeding two (2) feet compacted depth.

E. Employ a backfill placement method that does not disturb or damage pipelines, appurtenances, or utilities in trenches, bore pits, or other excavations. This includes, but is not limited to, not burying rocks of 2-inches in any dimension in or on the pipe trench.

F. When backfilling trenches, implement construction methods to prevent floatation of pipe and movement of appurtenances.

G. Maintain optimum moisture content of backfill materials to attain required compaction density. Provide and utilize vibration or special compaction equipment when required.

H. Repair and reestablish original grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations, vehicular traffic, or weather conditions. See Paragraph 3.04 of this Section and Section 01 45 00.

I. Remove surplus backfill materials from site. Bear all costs associated with loading and hauling excess fill off site.

J. Leave fill material stockpile areas free of excess fill materials. Contractor shall have the responsibility to load, haul, and spread all excess fill off-site. Scarify former stockpile locations grass areas, place top soil, and seed as required to return area to original or better condition.

3.05 TOLERANCES

A. Finish subgrade or rough graded surfaces shall not deviate by more than +/- 0.20-foot from the required section and grade.

B. Top Surface of Backfill in Ditches, Berms, Lawns, and Roadways: Plus or minus 1 inch from required elevations upon completion of settlement, but not to exceed 3 inches above finished grade prior to settlement.

C. Top Surface of Roadways and Driveways: Plus or minus 1 inch from required elevations upon completion of settlement in roadways and driveways, but not to exceed 3 inches above finished grade prior to settlement.

D. Top Surface of Backfill in Cultivated Areas: Plus or minus 3 inches from required elevations upon completion of settlement, but not to exceed 6 inches above finished grade prior to settlement.

E. Trenches and bore pit areas shall be kept within settlement tolerances through the warranty period. Only top soil shall be used to raise settled trenches and bore pit areas.

F. Finish subgrade or rough graded surfaces shall not deviate by more than 1 inch from the required section and grade.

3.06 FIELD QUALITY CONTROL

A. Section 01 45 00 – Quality Control.

B. Compaction testing will be performed in accordance with ASTM D698, ASTM D1557, and ASTM D6938.

C. If compaction tests indicate Work does not meet specified requirements, remove Work, replace, and retest at no additional cost to Owner.

D. Frequency of Compaction Tests:

1. Tests shall be performed per the schedule included in Paragraph 3.7 of this Section at random locations as directed by the Engineer's on-site project representative.

E. Testing to be paid for by Contractor.

3.07 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01 50 00.

B. Reshape and re-compact fills subjected to vehicular or machine traffic.

3.08 SETTLEMENT

A. The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after notice from the Engineer or Owner, or sooner if required by Engineer or Owner, depending on the critical nature of the settlement.

3.09 BACKFILLING AND COMPACTION SCHEDULE

A. Pipe encasement/bedding with ND Class 3 Modified Gravel per Section 31 05 16 as required or directed by Engineer, compacted to 95 percent of the Standard Proctor Density (ASTM D698).

B. Backfilling of Pipeline Trenches in Cultivated Areas:

1. Fill Type S1 or S2 per Section 31 05 13, from trench bottom to subgrade, compacted to 85 percent of the Standard Proctor Density (ASTM D698).
2. If pipeline trench settlement occurs, Contractor shall correct settlement to tolerances referenced in Paragraph 3.04 of this Section. If persistent settlement occurs, compaction testing is required.
3. Cover with Fill Type S4 (topsoil per Section 31 05 13).
4. Grade topsoil and prepare topsoil per Section 32 90 00.

C. Backfilling of Pipeline Trenches in Ditches and Landscaped Areas:

1. Fill Type S1 or S2 per Section 31 05 13, from trench bottom to subgrade, compacted to 90 percent of the Standard Proctor Density (ASTM D698).
2. If pipeline trench settlement occurs, Contractor shall correct settlement to tolerances referenced in Paragraph 3.04 of this Section. If persistent settlement occurs, compaction testing is required.
3. Cover with Fill Type S4 (topsoil per Section 31 05 13).
4. Grade topsoil and prepare topsoil per Section 32 90 00.
5. Backfilling Under Cast-In-Place and Precast Structures:
6. Fill Type A3 per Section 31 05 16, to 12 inches thick, compacted to 97 percent of the Standard Proctor Density (ASTM D698) and at +/- 2 percent of optimum water content.
7. Conduct one (1) density test of bedding material near center of structure or manhole.

D. Backfilling for Exterior Side of Cast-In-Place and Precast Structures:

1. Fill Type S1 or S2 per Section 31 05 13, to subgrade elevation, each lift compacted to 92 percent of the Standard Proctor Density (ASTM D698) and at +/-2 percent of optimum water content.
2. Conduct one (1) density test per each 4 feet of depth prior to placement of topsoil.
3. Cover with Fill Type S4 (topsoil per Section 31 05 13).
4. Grade topsoil and prepare topsoil per Section 32 90 00.
5. Backfilling of Hydrants, Valve Boxes, and Other Appurtenances:
6. Fill Type S1 or S2 per Section 31 05 13, from excavation bottom to subgrade, compacted to 90 percent of the Standard Proctor Density (ASTM D698).
7. Conduct one (1) density test per each 4 feet of depth prior to placement of topsoil.
8. Cover with Fill Type S4 (topsoil per Section 31 05 13).
9. Grade topsoil and prepare topsoil per Section 32 90 00.

E. Backfilling Under Gravel, Concrete, or Asphalt Roadways, Driveways, Sidewalks, and Bikepaths:

1. Fill Type A3 per Section 31 05 16 to 0.1 ft. below finished paving elevation compacted to a minimum of 97 percent of the Standard Proctor Density (ASTM D698).
2. Conduct one (1) density test per each 200 square feet and each 2 feet of depth.
3. If pipeline trench settlement occurs, Contractor shall correct settlement to tolerances referenced in Paragraph 3.04 of this Section.

END OF SECTION

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SECTION 31 23 33
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Excavating trenches for utilities.
2. Compacted bedding and fill of utilities to subgrade elevations.
3. Backfilling and compaction requirements for trenches.

B. Related Sections include, but are not limited to:

1. Section 01 45 00 - Quality Control.
2. Section 01 50 00 - Temporary Facilities and Controls.
3. Section 31 11 00 - Clearing and Grubbing.
4. Section 31 05 13 - Soil for Earthwork.
5. Section 31 05 16 - Aggregate for Earthwork.
6. Section 32 90 00 - Landscape Grading.

1.02 REFERENCES

A. Reference Standards include:

1. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
3. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.03 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.04 FIELD MEASUREMENTS

A. Verify that survey benchmark, control point, and intended elevations for the Work are as shown on Drawings.

1.05 COORDINATION

A. Coordinate work under provisions of Section 01 31 13.

B. Verify work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. Subsoil Fill: As specified in Section 31 05 13.

B. Aggregate Fill: As specified in Section 31 05 16.

PART 3 EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Notify utility company to locate utilities.

C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

D. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities that are to remain.

F. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Subsoil Type S1 or S2 and compact to density equal to or greater than requirements for subsequent backfill material.

3.02 EXCAVATING

A. Excavate topsoil in accordance with Section 31 14 13.

B. Excavate subsoil required for installation of utilities to required depths in accordance with Section 31 23 13.

C. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.

D. Do not interfere with 45 degree bearing splay of foundations. Underpin adjacent structures, as necessary, to prevent damage by excavation Work.

E. Hand trim for bell and spigot pipe joints. Remove loose matter.

F. Remove lumped subsoil, boulders, and rock up to 1/3 cubic yard, measured by volume.

G. Stockpile excavated material in an orderly manner, at sufficient distance from the trench to avoid overloading, to prevent slides and cave-ins. Remove excess material not being used from site.

H. In the event of shrinkage of excavated soils, resulting in a shrinkage of backfill along trenches, Contractor shall provide, haul, place, and compact suitable Subsoil Type S1 or S2 from an acceptable source at no cost to Owner.

I. Provide drainage surrounding trench continually. Water shall not be permitted to accumulate in the excavation.

J. Shore as required to protect workmen, banks, adjacent structures, and facilities.

K. Provide uniform bearing support for each pipe section along its entire length.

L. Excavate all unsuitable material from trench.

M. Excavate to an over-depth of a minimum of 6 inches below pipe in areas of bedrock or other extensive rock formations by jack hammer, blasting, or other approved method. Trench width shall be 1.25 times the outside diameter of the pipe.

3.03 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Aggregate Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

D. Soil Fill: Place and compact material in equal continuous layers not exceeding 12 inches compacted depth.

E. Employ a placement method that does not disturb or damage utilities in trench. Prevent floatation of pipe.

F. Maintain optimum moisture content of fill materials to attain required compaction density. Use vibratory or special compaction equipment when required.

G. Remove surplus fill materials from site.

H. Leave fill material stockpile areas completely free of excess fill materials. Contractor shall have the responsibility to load, haul, and spread all excess fill off-site.

3.04 TOLERANCES

A. As specified in Section 31 23 23 - Fill and Backfill.

3.05 FIELD QUALITY CONTROL

A. Section 01 45 00 - Quality Control: Field inspection and testing.

B. Compaction testing will be performed in accordance with ASTM D698 and ASTM D6938.

C. If tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest at no additional cost to Owner.

D. Frequency of Tests: Testing shall only be required if tolerances are not being met.

3.06 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01 50 00.

B. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.07 SCHEDULE

A. As specified in Section 31 23 23 - Fill and Backfill.

END OF SECTION

SECTION 31 25 00
EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. Prevention of sedimentation of waterways, wetlands, and storm and sanitary sewers due to construction activities.

B. Restoration of areas eroded due to insufficient preventative measures.

C. Related Sections include, but are not limited to:

1. Section 01 45 00 – Quality Control.
2. Section 01 50 00 – Temporary Facilities and Controls.
3. Section 31 05 13 – Soils for Earthwork.
4. Section 31 05 16 – Aggregates for Earthwork.
5. Section 31 11 00 – Clearing and Grubbing
6. Section 31 14 13 – Soil Stripping and Stockpiling.
7. Section 31 23 16 - Excavation.
8. Section 31 23 19 – Dewatering.
9. Section 31 23 23 – Fill and Backfill.
10. Section 31 23 33 – Trenching and Backfilling.
11. Section 31 25 00 – Erosion and Sedimentation Control.
12. Section 32 90 00 – Landscape Grading.
13. Section 32 97 00 – Restoration of Disturbed Areas.
14. Section 33 10 00 – Water Utilities.

1.02 REFERENCES

A. ASTM D4355/D4355M – Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc Type Apparatus.

B. ASTM D4491– Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

C. ASTM D4533/D4533M – Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

D. ASTM D4632/D4632M – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

E. ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.

F. ASTM D4873/D4873M – Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

G. ASTM D698 – Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).

H. General Permit Authorization to Discharge Storm Water Associated with Construction Activity under the National Pollutant Discharge Elimination System/State Disposal System Permit Program.

I. North Dakota Department of Transportation (NDDOT) Erosion and Sediment Control Handbook – Latest Edition.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Provide product specification sheets for the following erosion control materials to demonstrate that the Contractor's proposed products meet the Contract Document requirements:

1. Fabric proposed for silt fence
2. Fabric proposed for inlet protection
3. Inlet protection products, such as storm inlet sediment filters
4. Erosion Control Blanket
5. Gradation tests for Construction Entrance stone material

1.04 PERFORMANCE REQUIREMENTS

A. Comply with all requirements of the North Dakota Department of Environmental Quality Division of Water Quality for erosion and sediment control.

B. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained.

C. Timing: Put preventative measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

D. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.

1. Control movement of sediment and soil from temporary stockpiles of soil.
2. Prevent development of ruts due to equipment and vehicular traffic.
3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

E. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.

1. Prevent windblown soil from leaving the project site.
2. Prevent tracking of mud onto public roads outside of the site.
3. Prevent mud and sediment from flowing onto sidewalks and pavements.
4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

F. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.

1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
2. If sediment basins are used as temporary preventative measures, pump dry and remove deposited sediment after each storm.

G. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.

1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.

H. Open Water: Prevent standing water that could become stagnant.

I. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

PART 2 PRODUCTS

2.01 SILT FENCE

A. Geotextile Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:

1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested with ASTM D4751.
2. Permittivity: 0.05 secˆ-1, minimum when tested in accordance with ASTM D4491.

3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
4. Tensile Strength: 100 lb-f, minimum, in cross-machine direction; 124 lb-f, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
6. Tear Strength: 55 lb-f., minimum when tested in accordance with ASTM D4533/D4533M.
7. Utilize Wire Mesh Reinforcement as directed and shown on Drawings.
8. Color: Manufacturer's standard.

B. Silt Fence Supports

1. Posts: 5 feet long:
   a. Steel T-section, with minimum mass of 1.26 lb per linear foot

2.02 STORM SEDIMENT FILTER

A. Shall be one of the following:

1. Drop-in Sediment Trap.
   a. Geotextile Fabric unit that inserts into the inlet.
   b. Shall be:
      1) Dandy Sack by Dandy Products, Inc.

      2) Siltsack by ACF Environmental.

      3) or equal.

2.03 CONSTRUCTION ENTRANCE

A. Materials As Shown on Drawings.

B. 3-6 inch Stone

1. Stone/Crushed Concrete shall be angular and shall be comprised of hard, durable mineral materials that have been mechanically processed.
2. Stone/Crushed Concrete gradation shall conform to the following:

2.04 SLOPE EROSION PROTECTION SHALL BE ONE OF THE FOLLOWING

A. Erosion Control Blanket

1. Shall consist of a uniform web of interlocking fibers sandwiched between an attached top and bottom layer of net backing meeting the

requirements of Section 856.01 of the North Dakota Department of Transportation Standard Specifications for Construction, 2008 Edition.

2. The netting shall be biodegradable containing sufficient UV stabilization for breakdown to occur within a normal growing season.
3. Staples used to anchor the blankets shall be U-shaped, 11 gauge or heavier steel wire having a span width of 1 inch and a length of 8 inches or more from top to bottom after bending.
4. The erosion control blankets acceptable for use on this project include:
   a. Propex, LLC. – Landlok S2.
   b. North-American Green – SC150BN.
   c. or equal.

B. Bonded Fiber Matrix. (BFM)

1. The fibers shall be composed of 100% wood or wood by-products. A minimum of 25% of the fibers shall average 10.16 mm (0.4 inches) in length and 50% or more shall be retained on a Clark Fiber Classifier 24 mesh screen. Fibers shall be colored with a water soluble, non-toxic dye, to aid in uniform application over the site.
2. The binder shall be a hydro colloid based (guar gum) with added slow-release and agricultural based fertilizers. The binder shall not dissolve or disperse upon rewetting.
3. The BFM slurry shall dry to form a crust approximately 3-6 mm (1/8 to ¼ inches) thick adhering to the soil surface.
4. The moisture content of the matrix shall be 12% +/- 3% by weight.
5. The matrix shall consist of materials that are 100% biodegradable and 100% beneficial to plant life.
6. The installation rate of the BFM shall be 3,500 lbs per acre, minimum.
7. The matrix shall provide 100% continuous coverage and shall have no holes greater than 1 mm in size.
8. The hydrated matrix density shall be approximated by a slump test prior to application.
9. The BFM mulch: water ratio shall be as per the manufacturer recommendations. The minimum BFM mulch to water ratio is 50 lbs. BFM mulch and 100 gallons water. The water rate will vary between 100 gallons and 125 gallons per 50 lbs., depending on which of the products is used.
10. The Bonded Fiber Matrix mulch products acceptable for use on this project include:
    a. HydraCM – Manufactured by Tensar North American Green
    b. EcoAegis – Manufactured by CANFOR.
    c. Soil Guard – Manufactured by Mat, Inc.
    d. ConWed 3000 – Manufactured by ConWed Fibers, Inc.

C. Fiber Roll

1. Fiber rolls shall consist of hay or straw free of noxious weeds, or wood excelsior that has been compressed and stuffed into degradable netting.
2. The roll diameter shall be a minimum of nine (9) inches.
3. All weighted fiber rolls shall contain a weighted core with a minimum weight of eight pounds per foot.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

B. The Contractor shall follow all requirements of the current North Dakota Department of Environmental Quality Division of Water Quality regulations.

3.03 SCOPE OF PREVENTATIVE MEASURES

A. Vehicle Tracking Pad at Construction Entrances: Traffic-bearing aggregate surface and metal grate, as shown on Construction Details.

1. Width: As required; 20 feet, minimum.
2. Length: 50 feet, minimum.
3. Provide at each construction entrance from public right-of-way.
4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.

B. Natural vegetation shall be retained whenever feasible.

C. Land grading and excavating shall be kept at a minimum to reduce the possibility of creating runoff and erosion problems which require extensive control measures.

D. Land exposure shall be minimized in terms of area and time.

E. Silt Fence.

1. Provide along the perimeter edge of soil stockpiles located on the Owner's property.
2. Provide at locations shown on the Plans.

F. Storm Sediment Filters.

1. Place immediately after new storm sewer inlets are installed and immediately before land is disturbed adjacent to existing storm sewer inlets or as directed by Engineer.

G. Slope Erosion Protection.

1. Place at locations shown in the Plans or as directed by Engineer.

H. Fiber Roll

1. Place at locations shown in the Plans or as directed by Engineer.

3.04 INSTALLATION

A. Storm Sediment Filters.

1. Drop-in Sediment Trap.
   a. Place as recommended by the manufacturer.

B. Slope Erosion Protection

1. Bonded Fiber Matrix (BFM).
   a. The Contractor shall install the BFM as per the manufacturer's instructions with the following minimum guidelines:
      1) The BFM shall be applied with hydraulic spray equipment by a manufacturer's certified applicator.

      2) Application shall be done at least 24 hours in advance of projected rainfall to allow the BFM mulch adequate time to dry.

      3) The BFM mulch shall be applied into two stages (one-half rate) with ample time to dewater the first application.

      4) The BFM mulch shall be applied from at least two alternate directions, preferably 90 degrees apart if possible, to ensure all soil faces are covered.

      5) The installation rate of the BFM mulch shall be 3500 lbs per acre, minimum and 100% continuous coverage.

      6) After the BFM mulch is applied and dried for 24 to 48 hours, the Owner's Representative will sample and quantify a portion of the installation to ensure the minimum 3500 lbs per acre has been applied. If it is found that the desired 3500 lbs per acre has not been achieved, the Contractor shall apply an additional amount to equal the desired 3500 lbs per acre within 48 hours of receiving the test results. The Contractor will not be paid extra mobilization costs for spraying additional material.

2. Erosion Control Blanket.
    a. The Contractor shall install the blanket as per the manufacturer's instructions with the following minimum guidelines:
        1) The Contractor shall roll out or lay the blankets parallel to the direction of water flow.
        2) The blankets shall be spread evenly without stretching and so the fibers are in direct contact with the soil over the entire area.
        3) Adjacent strip edges shall overlap each other at least 4 inches.
        4) Strip ends shall overlap each other at least 7 inches.
        5) All overlaps shall be made with the upgrade strip placed over the down grade strip intervals.
        6) The Contractor shall bury the upgrade end of each blanket strip at least 6 inches in a vertical slot in the soil with the soil being pressed firmly against the embedded blanket.
        7) All joints and outer edges of the blanket shall be stapled at 3 foot intervals or less.
        8) Staples placed at junctures and strip ends shall have a maximum spacing of 16 inches.
        9) Staples shall be placed throughout the blanket at a maximum spacing of 3 feet.
        10) All staples shall be inserted flush with the ground surface.

C. Silt Fences

1. Store and handle fabric in accordance with ASTM D4873/D4873M.
2. Install with top of fabric at nominal height and embedment indicated on drawings.
3. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
4. Fasten fabric to steel posts using "U" shaped clips.

D. Fiber Roll:

1. Each fiber roll shall be overlapped by 1 foot minimum and tied tightly together, to prevent flow between the fiber roll ends.
2. Fiber rolls shall be trenched and staked according to manufacturer's specifications.

3. Six inch fiber rolls shall be used for sheet flow protection on backslopes and foreslopes.
4. Twelve to twenty inch fiber rolls shall be used in ditch bottoms and in areas where shallow concentrated flow is present.

3.05 MAINTENANCE

A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches (13 mm) or more rainfall at the project site, and daily during prolonged rainfall.

1. All inspections and maintenance conducted during construction shall be recorded in writing and retained in accordance with the storm water permit.

B. All removed tree material shall become the property of the Contractor and shall be disposed of off-site in Contractor furnished disposal area.

C. All stumps and roots shall be removed to a minimum of 3 feet below grade.

D. Backfill excavation with suitable on-site soil materials or engineered fill compacted to a minimum of 95% of Standard Proctor Density, ASTM D698.

E. Silt Fences:

1. Promptly replace fabric that deteriorates unless need for fence has passed.
2. Remove silt deposits that exceed one-third of the height of the fence.
3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff of other causes.

F. Fiber Rolls:

1. Sediment deposits shall be removed when the deposit reaches half the height of the fiber roll or when directed by the Engineer.
2. Fiber rolls shall remain in place until the vegetative cover is restored to 70 percent of the preexisting vegetation.

3.06 CLEAN UP

A. Clean out sediment control structures that are to remain as permanent measures.

B. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Engineer.

C. Where removal of temporary measures would have exposed soil, shape surface to an acceptance grade and finish to match adjacent ground surfaces.

END OF SECTION

DIVISION 32
EXTERIOR IMPROVEMENTS

SECTION 32 05 19
GEOSYNTHETICS FOR EXTERIOR IMPROVEMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Geotextile for separation.

B. Geotextile for filtration.

C. Geogrid for stabilization.

1.02 RELATED REQUIREMENTS

A. Section 31 10 00 - Site Clearing.

B. Section 31 23 16 - Excavation.

C. Section 31 23 23 - Fill and Backfill

D. Section 31 23 33 - Trenching and Backfilling

1.03 REFERENCE STANDARDS

A. AASHTO M 288 - Standard Specification for Geosynthetics for Highway Applications; 2024.

B. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016 (Reapproved 2023).

C. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus; 2021.

D. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 2022.

E. ASTM D4595 - Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method; 2017.

F. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a (Reapproved 2023).

G. ASTM D4716/D4716M - Standard Test Method for Determining the (In-Plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head; 2022.

H. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile; 2021a.

I. ASTM D4833/D4833M - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products; 2007 (Reapproved 2020).

J. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2017 (Reapproved 2021).

K. ASTM D4886 - Standard Test Method for Abrasion Resistance of Geotextiles (Sandpaper/Sliding Block Method); 2023.

L. ASTM D5199 - Standard Test Methods for Measuring the Nominal Thickness of Geosynthetics; 2025.

M. ASTM D5321/D5321M - Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear; 2026.

N. ASTM D6637/D6637M - Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method; 2015 (Reapproved 2023).

O. ASTM D7005/D7005M - Standard Test Method for Determining the Bond Strength (Ply Adhesion) of Geocomposites; 2016 (Reapproved 2024).

P. ASTM D7179 - Standard Test Method for Determining Geonet Breaking Force; 2018 (Reapproved 2025).

Q. ASTM D7737/D7737M - Standard Test Method for Individual Geogrid Junction Strength; 2015 (Reapproved 2023).

R. ASTM D7877 - Standard Guide for Electronic Methods for Detecting and Locating Leaks in Roofing and Waterproofing Membranes; 2025.

S. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene preinstallation meeting one week prior to start of work of this section; require attendance by affected installers.

B. Sequencing: Install utility connections before geosynthetics.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data on each product used, including physical properties, seaming materials, and installation instructions.

C. Shop Drawings:

1. Indicate overall layout, dimensions, geotextile sheet, and seam layout.
2. Indicate anchorage, penetration, and seaming details.

D. Certificate: Certify that products of this section meet or exceed specified requirements.

E. Manufacturer's Instructions: Indicate seaming method.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least 3 years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least 3 years of documented experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Identify, store, and handle geosynthetic rolls and samples in accordance with ASTM D4873/D4873M.

B. Protect materials from sunlight and other ultraviolet light sources during storage.

C. Handle geosynthetics carefully and prevent dragging, dropping, or imbalanced lifting.

1.08 FIELD CONDITIONS

A. Temperature Requirements: Do not place geosynthetic when ambient air or base surface temperature is less than 40 degrees F (4 degrees C) or above 140 degrees F (60 degrees C).

B. Surface Requirements: Do not place geosynthetic when receiving surface is saturated or has ponded water.

C. Follow recommendations of geosynthetic manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. SKAPS Industries

B. Solmax

C. US Fabrics Inc; _____:

2.02 GEOSYNTHETIC

A. Provide geosynthetic in largest size sheets possible to minimize field joining.

B. Uniform thickness in accordance with ASTM D5199.

C. Resistant to mildew and chemicals in soil, stable under freeze-thaw cycles, does not shrink or expand under wet conditions, and does not unravel or become clogged during use.

D. Ultraviolet Stability: 65 percent, minimum, when tested in accordance with ASTM D4355/D4355M.

E. Abrasion Resistance: 80 percent loss for 250 cycles, when tested in accordance with ASTM D4886.

2.03 GEOTEXTILE

A. General:

1. Material: Polyethylene consisting of 5 percent maximum regrind and free of contaminants.
2. Survivability: Class 1, when tested in accordance with AASHTO M 288.
3. Elongation: 35 percent, minimum, when tested in accordance with ASTM D4632/D4632M.

B. Geotextile for Separation: Capable of restricting adjacent material mixing.

1. Type: Woven.
2. Seams: Loose laid.
    a. Overlap: According to manufacturer.
        1) 12 inches (300 mm), minimum.
3. Grab Strength: 300 lbf (1.3 kN), minimum, when tested in accordance with ASTM D4632/D4632M.
4. Puncture Strength: 450 lbf (2 kN), minimum, when tested in accordance with ASTM D4833/D4833M.

C. Geotextile for Filtration: Capable of allowing liquid passage while restricting solids.

1. Type: Nonwoven.
2. Seams: Mechanically sewn.
    a. Overlap: 3 inches (76 mm).
    b. Stitch: Flat; continuous; tied off at ends.

3. Grab Strength: 300 lbf (1.3 kN), minimum, when tested in accordance with ASTM D4632/D4632M.
4. Permittivity: 0.5 per second, minimum, in accordance with ASTM D4491/D4491M.
5. Apparent Opening Size: No.40, 0.016 inch (0.425 mm), maximum, when tested in accordance with ASTM D4751.
6. Sewn Seam Strength: 275 lbf (1.25 kN), minimum, when tested in accordance with ASTM D4632/D4632M.

2.04 GEOGRID

A. General:

1. Material: Polyethylene consisting of 5 percent maximum regrind and free of contaminants.

B. Products:

C. Geogrid for Stabilization: Capable of reducing deformation of unbound granular materials.

1. Seams: Loose laid.
   a. Overlap: 12 inches (30 cm).
2. Ultimate Tensile Strength: 1,300 lbf/ft (19 kN/m), minimum, when tested in accordance with ASTM D6637/D6637M.
3. Junction Strength: 25 lbf (0.11 kN), minimum, when tested in accordance with ASTM D7737/D7737M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify receiving surface is smooth, without ruts or protrusions, and grades are according to design drawings.

B. Verify geosynthetic is free of defects or flaws that degrade physical performance.

3.02 PREPARATION

A. Remove vegetation, boulders, and rocks larger than 3/4 inch (20 mm) in size and other sharp objects, see Section 31 10 00.

B. Remove unsuitable materials, see Section 31 23 16.

C. Fill in holes, including stake holes, backfill, and fill, see Section 31 23 23.

3.03 INSTALLATION

A. General:

1. Notify Engineer minimum of 24 hours before geosynthetic installation.
2. Prevent surface drainage from eroding under geosynthetic. Repair undermined areas before backfill.
3. Position geosynthetic smooth and wrinkle-free on prepared surface; unroll or unfold carefully, avoiding stretching.
4. Secure geosynthetic to prevent movement or damage during installation.
5. Perform seaming in adequate lighting. Seam each geosynthetic member immediately after final placement. Clean sheets of dust, dirt, and other foreign matter before seaming.
6. Follow manufacturer's recommended installation procedures.

B. Separation:

1. Install geotextile according to manufacturer's recommendations.
2. Lay sheets in direction of construction.
3. Place adjacent geotextile and loosely fasten until seamed.
4. Repairs: Remove damaged portion of geotextile and seam additional layer to cover affected area.

C. Filtration:

1. Install geotextile according to manufacturer's recommendations.
2. Lay sheets in direction of construction.
3. Place adjacent geotextile and loosely fasten until seamed.
4. Protect geotextile from surface runoff contamination before backfill.
5. Repairs: Remove damaged portion of geotextile and seam additional layer to cover affected area. Replace geotextile where surface runoff contamination has occurred.

D. Stabilization:

1. Install geogrid according to manufacturer's recommendations.
2. Lay sheets in direction of construction.
3. Allow geogrid to lie in relaxed state 1/2 hour, minimum before attachments.
4. Repairs: Remove damaged portion of geogrid, and seam additional layer to cover affected area.

E. Drainage:

1. Install geocomposite according to manufacturer's recommendations.
2. Lay sheets in direction of incline.
3. Allow geocomposite to lie in relaxed state 1/2 hour, minimum before attachments.
4. Repairs:
   a. Remove damaged portion of geonet and seam additional layer to cover affected area.

b. Remove damaged portion of geotextile and seam additional layer to cover affected area.

3.04 BACKFILL

A. Obtain approval for geosynthetic sheet installation from Engineer before placing fill.

B. Backfill in manner to prevent damage to geosynthetic. Repair geosynthetic damaged during backfill operations.

C. Cover geosynthetic in installed direction, see Section 31 23 23.

3.05 FIELD QUALITY CONTROL

A. See Section 01 45 00 - Quality Control for additional requirements.

B. Provide geosynthetic installation schedule to manufacturer's field representative.

C. Inspect completed liner for pinholes, punctures, and tears; inspect seams and joints for unbonded areas. Repair defects or damages found.

END OF SECTION

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SECTION 32 12 16
BITUMINOUS PAVEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. The construction of one or more pavement courses of bituminous-aggregate mixture on the approved prepared foundation, base course, or existing surface in accordance with the specifications and in conformity with the lines, grades, and thicknesses and typical cross sections shown on the plans or established by the Engineer.
2. Tack coat

B. Related Work:

1. Section 01 33 00 - Submittal Procedures.
2. Section 01 45 00 - Quality Control.
3. Section 01 50 00 - Temporary Facilities and Controls.
4. Section 32 97 00 - Restoration of Disturbed Areas.

1.02 REFERENCES

A. ASTM D3665 – Standard Practice for Random Sampling of Construction Materials.

B. ASTM D4791 – Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

C. ASTM D5821 – Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate.

D. The Asphalt Institute – SP-2 Superpave Mix Design Manual

E. The Asphalt Institute – AI MS-2 MS-2 Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.

F. The Asphalt Institute – MS-3 Asphalt Plant Manual.

G. The Asphalt Institute – MS-8 Asphalt Paving Manual.

H. The Asphalt Institute – MS-19 Basic Asphalt Emulsion Manual.

I. North Dakota Department of Transportation (NDDOT) Standard Specifications for Road Construction and Bridge Construction, Latest Edition.

J. AASHTO M320 (ASTM D 6373)– Standard Specification for Performance-Graded Asphalt Binder.

K. AASHTO MP2 (TAI SP-2) – Specification for Superpave Volumetric Mix Design.

L. AASHTO T96 (ASTM C 131) – Standard Method of Test for Resistance to Degradation of Small- Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

M. AASHTO T104 (ASTM C 88) – Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

N. AASHTO T166 (ASTM D2726) – Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens.

O. AASHTO TP4 (ASTM 6925) – Standard Method for Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor.

P. AASHTO T176 (ASTM D2419) – Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.

Q. AASHTO T304 (ASTM C 1252) – Standard Method of Test for Uncompacted Void Content of Fine Aggregate.

1.03 SUBMITTALS FOR REVIEW

A. Section 01 33 00 – Submittal Procedures.

B. Product Data: Furnish materials properties data on aggregates, asphalt cement, bituminous mixtures, asphalt binder, and other materials required for the mix in accordance with Sections 01 33 00 and 01 45 00 at least 7 days prior to beginning paving operations. Engineer must approve job mix formula prior to its use on Project.

1.04 PERFORMANCE REQUIREMENTS AND QUALITY ASSURANCE

A. When referenced, perform Work in accordance with the North Dakota Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

B. Obtain all materials from same source throughout project unless approved by the Engineer.

C. Paving: Designed for H20 classification.

D. Mixing Plant and Mixing Plant Operations: Conform to the North Dakota Department of Transportation Standard Specifications for Road and Bridge

Construction, latest edition, and The Asphalt Institute (TAI) MS-3 Asphalt Plant Manual.

E. Paved surfaces shall be warranted against any materials and/or workmanship defects for a period of twelve months from placement.

F. The mix design and development of the Job Mix Formula shall be generated by a laboratory

1. accredited by the AASHTO Materials Reference Laboratory (AMRL) at the contractor's expense.

G. For tack coat, ensure a sufficient bond between the surface being paved over and the overlying asphaltic course being placed.

1.05 REGULATORY AND ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt when ambient air temperature (in the shade and away from artificial heat) or base surface temperature is less than 40 degrees F or when surface is wet, dirty, or frozen.

B. No work will be permitted in the spring until the frost has disappeared and the subgrade is stable so as to support the equipment without rutting, shoving, pumping, or other displacement.

C. Conform to applicable code for paving work on public property.

D. Minimize interference with traffic.

E. Conform to the North Dakota Department of Health Clean Air Standards and Stormwater Runoff Standards.

F. Allow minimum of 1 month between completion of crack sealing and paving operation to allow seal to cure. The crack sealing should be accomplished with a recessed configuration if paving is to proceed in the same season.

G. Dispose of all waste material or reject material by approved methods.

H. Conform to the Manufacturer's Material Safety Data Sheet (MSDS) for storage and handling of

1. Emulsion products.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Protect the general public from coming in contact with sprayed oil.

B. Do not spray asphalt tack coat if weather conditions call for rain before the emulsion can cure.

PART 2 PRODUCTS

2.01 GENERAL

A. Asphalt Cement: Asphalt cement shall be performance graded asphalt cement meeting the requirements of AASHTO MP1 and as shown on the plans. Asphalt cement for most construction shall be PG 58-28.

B. Aggregate for Mix: The aggregate mix shall be in accordance with section 430.03.B of the NDDOT Standard Specifications for ROAD AND BRIDGE CONSTRUCTION, 2014 EDITION.

2.02 TACK COAT

A. SS1H or CSS1H Emulsion meeting the appropriate requirements of ASTM for the specific grade of emulsion. Non-tracking tack products may also be used as approved by the Engineer.

B. Storage and handling of the emulsion should be performed in accordance with MS-19.

C. Application rate shall be as necessary to create strong bond between layers of pavement but shall be not less than 0.10 gallons per square yard of undiluted asphalt.

D. All conventional asphalt emulsions shall be diluted with water at a 50:50 ratio and applied at twice the recommended application rate. Polymer modified and non-tracking emulsions shall not be diluted. Dilution of the emulsion product should be performed at the emulsion terminal or in a tank at the asphalt plant. Emulsions should not be diluted in the distributor at the project site.

E. Do not allow asphalt emulsion to freeze.

2.03 MIX DESIGN

A. Contractor shall develop the Superpave FAA41 asphalt mixture in accordance with section 430 of the

1. NDDOT Standard Specifications for Road and Bridge Construction, 2014 Edition, to meet the requirements of this Specification. Prior to the production of any Superpave asphalt mixture, submit the proposed mix design with supporting test data indicating compliance with all Superpave mix design criteria. The Contractor shall utilize an AMRL accredited testing firm for the development of the mix design, testing for the performance of the asphalt cement, gradation of the aggregate mix, and requirements of the L.A. Abrasion. The Engineer shall approve the job mix formula submitted by the Contractor.

B. Traffic Levels: The type of bituminous mixture for this project shall be designed based on the traffic level of less than one (1) Million Equivalent Single Axle Loads (ESALs).

C. Layer Thickness: The lift thickness shall be three times the nominal maximum size of the aggregate.

PART 3 EXECUTION

3.01 INSPECTION

A. For new construction, reconstruction, or full depth repair, verify that compacted subgrade is dry, stable, compacted to specified density, and to proper elevations and grade slopes. Ensure base coarse meets the requirements specified in section 32 11 23 Aggregate Base Course. Do not begin asphalt-paving construction without Engineer's authorization.

B. For overlay and wear course construction, verify that the existing bituminous mat is clean, dry, stable, at proper temperature, and to proper elevations and grade slopes. Do not begin asphalt-paving construction without Engineer's authorization.

C. Each course shall be compacted and cooled to such a degree that it will not be displaced or otherwise damaged before another course may be placed thereon.

D. Verify the provisions of Section 01 45 00 have been satisfied.

3.02 PREPARATION

A. Notify Engineer and Owner at least 72 hours in advance of temporary disruptions of traffic along route of construction.

B. Saw cut and tack all joints between new and existing pavement. All vertical faces shall have two coats of tack applied.

C. An asphalt tack coat shall be applied to existing asphalt and concrete surfaces, and to the surface of each course or lift constructed, except for the final course or lift in accordance with this Section.

D. All vertical faces shall have 2 applications of tack coat prior to paving. This includes, but is not limited to, curb and gutter faces and all longitudinal bituminous seams.

3.03 ASPHALT PAVEMENT CONSTRUCTION

A. All mixtures shall be spread and finished with a self-propelled, bituminous paver, to the required grade and cross section, leaving the mixture uniformly dense, smooth, and free from irregularities.

B. The speed of the bituminous paver shall be controlled to place the mixture uniformly and

1. continuously without tearing or gouging. The speed shall not exceed the Manufacturer's recommendation and shall be coordinated with the output of the plant to provide for a smooth, continuous operation, minimizing starting and stopping.

C. Compact pavement by rolling to specified density as follows:

1. Compaction shall consist of initial or breakdown rolling, intermediate rolling, and final or finish rolling with rollers meeting all requirements of NDDOT Standards Specifications Section 151.01 and which are approved by the Engineer.
2. Breakdown rolling shall consist of one or more complete coverages with a vibratory steel wheel roller or a rubber-tired roller.
3. Breakdown rolling shall be followed by intermediate rolling with either a rubber-tired roller or a vibratory steel wheel roller and shall be continued until the surface is tightly bound and shows no displacement under the roller.
4. Intermediate rolling shall be completed before the mat temperature falls below 185 degrees F.
5. Final rolling shall be performed with a static steel wheel roller and shall continue until roller marks are eliminated. Contractor may be required to modify rolling sequence to best suit the construction conditions.
6. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

D. Uniformly blend pavement surface into elevations at curbs, valve box castings, and other critical points of contact. Place pavement so that the pavement is 3/8 inches higher than the edge of the structure after the pavement has been compacted.

E. Do not allow drainage to be impeded or casting covers to become difficult to remove.

F. All transverse and longitudinal joints, high or low areas, and surface irregularities, shall be leveled, filled, or raked prior to compaction. Any loose material dropped on previously compacted lanes shall be removed immediately.

G. Ensure joints made during paving operations are straight, clean, vertical, and free of broken or loose material. Joints shall be tacked and constructed with adequate bond on abutting surfaces. Construction joints in successive courses shall be placed so that joints do not fall on the same vertical plane.

H. The sequence of rolling operations and the selection of type and number of rollers shall be commensurate with production, and shall be adequate to obtain the specified density before the mat temperature falls below 185 degrees F.

I. Install all bituminous pavement 3.5-inches and greater in thickness in a minimum of two lifts. Maximum thickness of a base course lift shall be 3.0-inches.

J. Ensure surface of completed asphalt pavement is true to lines, profiles, and elevations indicated and matches existing grade.

K. The surfaces of previously placed layers shall be swept, and a tack coat applied before spreading the next layer.

L. The overall thickness shown on the Drawings shall be the minimum finished, in-place, compacted thickness of bituminous pavement.

M. Protect newly paved surfaces from traffic and mechanical damage until surface has cooled to

1. 140-degrees Fahrenheit.

N. Any low or high defective areas shall be corrected immediately at the contractor's expense. Corrective Work shall include patching, cutting out the surface and replacing with fresh, bituminous mixture, or by milling the surface.

O. Clean up paving area.

P. Ensure manhole covers are clean of all asphalt material and tack coat and returned to the condition they were prior to asphalt paving activities.

3.04 TACK APPLICATION EQUIPMENT

A. Tack distributor shall be designed, equipped, maintained, and operated so that tack material is applied at the specified rate per square yard with uniform pressure over the required width application.

B. The distributor shall be equipped with an onboard computer that determines the relationship between the distributor travel speed and pump speed to ensure a consistent application rate.

C. An accurate and calibrated thermometer with a range covering the specified application temperature for tack material shall be mounted at approximately center height of the tank with the stem extending into the tack material.

D. The distributor shall have a full circulating system with a spray bar, adjustable laterally and vertically. The spray bar shall be maintained at a constant height above the pavement under variable load conditions.

E. The distributor shall have full circulation spray bars with lateral and vertical adjustments.

F. Ensure that all nozzles are of the same size and type to ensure uniform application of emulsion.

G. Ensure that all nozzles are at the same angle to ensure uniform application of emulsion.

H. The distributor shall be checked and calibrated. A certificate of the calibration shall be posted in the driver's compartment stating that the distributing system is in good working condition and when used with the charts and instructions furnished by the manufacturer will give the required results. The certificate shall bear the date of calibration and signature of the calibrating agency.

I. Use pumps with proper clearances for handling to avoid binding and seizing. Avoid repeated pump cycling or frequent pumping.

J. DO NOT mix different classes, grades, or types of emulsified asphalt in storage tanks, transports or distributors. Make sure tanks are totally clean before changing to another class, grade, or type.

K. Pump from bottom of tank.

L. Do not overheat asphalt emulsion.

3.05 APPLICATION OF TACK COAT

A. Maintain proper distributor spray bar height and spray nozzle angle for proper coverage.

B. Maintain proper distributor speed.

C. Sweep and clean surfaces to be tack coated prior to application. Provide motorized brooms with a positive means of controlling vertical pressure and with the capability to clean the road surface prior to spraying the bituminous material.

D. Do not apply more tack coating than can be covered by the same day's operation. Perform operations only during daylight hours and not during foggy weather.

E. Do not apply tack coating or fog seal when ambient air temperature is consistently below 40 degrees F or when surface is wet.

F. Do not over-spread tack coating. If "fat spots" develop, spread out excess emulsion by pneumatic tire rolling before placing pavement.

G. Allow enough time for tack coat to "break" before placing pavement.

H. Apply tack coat as directed in Section 401 of the North Dakota Department of Transportation Standard Specifications for Road and Bridge Construction, latest Edition and NAPA's Best Practices for Emulsion Tack Coats. Hand spray wands and crack-sealing buckets are not acceptable methods of applying tack coat emulsion except on the vertical face of an adjoining lift of pavement.

I. Apply bituminous tack coat to existing bituminous pavement and to the surface of each lift or course constructed, other than the final course. Apply in a uniform rate with no missed areas permitted.

J. The bituminous tack coat shall be applied at a uniform rate of not less than:

1. gallons per square yard, for undiluted asphalt emulsion (as supplied from the emulsion terminal); application rate shall be adjusted if necessary, to attain bond between courses.
2. gallons per square yard, for diluted asphalt emulsion (with water added at the terminal or plant emulsion tank).

K. The temperature of emulsion shall be between 70- and 160-degrees F at the time of application.

L. Apply immediately prior to the placement of the next bituminous course or lift. Do not allow public traffic on tack coated areas. The tack coat shall be applied in a manner that offers the least inconvenience to traveling public.

M. Apply the tack coat on the same day as the proposed surfacing is to be performed. Where emulsified asphalt is specified, dilute one part of water to one part of emulsion and apply the mixture at two times the undiluted rate of application. Allow water to evaporate completely before beginning paving operations. At request of Contractor, Engineer may approve a change in the dilution ratio of the water-emulsion mixture. Sampling and Testing of the emulsion product shall be done at the discretion of the Engineer.

N. Demonstrate a uniform application of asphalt emulsion producing 100 percent coverage of the surface after curing, as approved by the Engineer. Stop operations if the application demonstration does not meet the coverage requirements.

O. Contractor shall continuously check Tack Coat application rates to make necessary changes to those rates in order to make sure that the diluted emulsion absorbs into the pavement. Contractor to perform a yield check at the beginning of each project. Engineer may require additional yield checks if the application rate is questioned.

P. Do not allow traffic on the tacked surface until after the bituminous material has set and will not pick up on vehicle tires.

3.06 PROCESS CONTROL

A. Section 01 45 00 – Quality Control: Field inspection and testing.

B. Perform field and laboratory testing by an independent testing laboratory appointed and paid for by the Contractor.

C. At the start of mix production, samples of all aggregate stockpiles shall be randomly collected for each aggregate used in the production mixture. The production aggregates shall be tested for the consensus properties and gradations presented in Section 2.01 and shall conform to the JMF tolerances. Any change in aggregate source will not be allowed without written notification of the Engineer and the submittal of a new JMF.

D. Notify testing laboratory to perform density tests when testing is to be performed during construction.

E. If, during progress of Work, tests indicate that compacted materials do not meet specified requirements, remove defective Work, replace, and retest. Contractor to bear all costs associated with defective pavement Work.

F. Perform gradation analysis of aggregate once per day as construction progresses or as required by the Engineer.

G. Perform voids in mineral aggregate (VMA) analysis in accordance NDDOT Specifications; minimum frequency of one test per day as construction progresses.

3.07 TOLERANCES

A. Flatness: Maximum variation of 3/16 inch measured with 10-foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch of specified thickness.

C. Variation from true elevation: Within ½ inch.

D. Transverse slope of surface course shall not vary from the slope shown on plans.

E. Asphalt cement content within 0.5 percent of approved mix design as determined by asphalt ignition testing.

3.08 SCHEDULE

A. BITUMINOUS PAVEMENT:

1. Areas as shown on Drawings or as directed by Engineer. Repair any bituminous pavement damaged by construction activities. Minimum compacted thickness to match existing.

END OF SECTION

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SECTION 32 13 13
CONCRETE PAVEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Portland cement concrete pavement.
2. Concrete sidewalks, driveways, and curbs and gutters.
3. Special decorative and colored concrete pavement.
4. Reinforcement.
5. Joints and Joint Sealer.
6. Surface Finish.
7. Curing.
8. Construction requirements.
9. Materials.

B. Related Sections include:

1. The General Conditions, Supplementary Conditions, and General Requirements apply to work of this section.
2. Division 1 – General Requirements Specification Sections.
3. Division 31 – Earthwork Specification Sections.
4. Division 32 – Exterior Improvements.

1.02 REFERENCES

A. References include, but are not limited to:

1. Standard Construction Specifications of the City of Williston.
2. North Dakota Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.
3. American Association of State Highway Transportation Officials (AASHTO).
4. ACI 301 – Specifications for Structural Concrete Buildings.
5. ACI 304 – Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
6. ACI 305R – Recommended Practice for Hot Weather Concreting.
7. ACI 306R – Recommended Practice for Cold Weather Concreting.
8. ASTM A494 – Chemical Admixtures for Concrete.
9. ASTM A497 – Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
10. ASTM A615 – Deformed and Plain Billet-Steel for Concrete Reinforcement.

11. ASTM C33 – Concrete Aggregates.
12. ASTM C94 – Ready Mix Concrete.
13. ASTM C150 – Portland Cement.
14. ASTM C260 – Air-Entraining Admixtures for Concrete.
15. ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete.
16. ASTM C494 – Chemical Admixtures for Concrete.
17. ASTM D1751 – Performed Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.03 SUBMITTALS FOR REVIEW

A. See Section 01 33 00 – Submittal Procedures.

B. Product Data: Furnish data on aggregates, Portland cement, air-entraining agent, admixtures and other materials and on plant mix design in accordance with Sections 01 33 00 and 01 45 00 at least 7 days prior to beginning paving operations. Engineer must approve mix formula prior to its use on Project.

C. Samples for Verifications: For each type of exposed color, pattern, or texture indicated.

1.04 PERFORMANCE REQUIREMENTS AND QUALITY ASSURANCE

A. Perform Work in accordance with the Standard Construction Specification of the City of Williston and the Contract Documents.

B. Perform Work in accordance with the North Dakota Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

C. Batch Plant and Mixing Operations: Conform to North Dakota Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition; ACI 304; and the Standard Construction Specifications of Cass Rural Water District (CRWD).

D. Obtain all materials from same source throughout Project.

1.05 REGULATORY AND ENVIRONMENTAL REQUIREMENTS

A. Conform to applicable standards for paving Work on public and private property.

B. Perform concrete paving Work in accordance with ACI 301.

C. Conform to Section 01 50 00 – Temporary Construction Facilities and Controls. Minimize interference with traffic.

D. Perform concrete paving Work during extreme temperature conditions in accordance with ACI 305R for Hot Weather Concreting and ACI 306R for Cold Weather Concreting.

E. Perform Work when ambient air temperature is rising and above 35 degrees F (measured in the shade and away from artificial heat). Discontinue Work when ambient air temperature is falling and reaches 40 degrees F (measured in the shade and away from artificial heat). Submit details of Contractor's means of cold weather, frost protection for newly deposited concrete to Engineer for approval.

F. Do not place concrete when base or foundation is wet or frozen or when atmospheric conditions exist that would cause abnormal shrinking and checking of the pavement.

PART 2 PRODUCTS

2.01 FORM MATERIALS

A. Forms shall be of such cross-section and strength, and so secured as to resist the pressure of the concrete when placed, impacted, and by vibration of any equipment, which they support, without spring or settlement.

B. Except for metal forms, use new material, as needed. Previously used forms may be reused during the progress of the work, provided they are completely cleaned, reconditioned, recoated for each use, and capable of producing formwork of the required quality.

C. For exposed concrete surfaces, provide forms that will give an aesthetically pleasing look when completed.

2.02 REINFORCEMENT

A. All reinforcing materials and accessories shall be new, no exceptions.

B. Reinforcing Steel: ASTM A615, 60 ksi yield grade billet steel deformed bars; uncoated finish.

2.03 CONCRETE MATERIALS

A. Portland Cement: Conform to ASTM C150, Type I, II, or III Portland cement, gray color.

B. Fine and Coarse Mix Aggregates: Conform to ASTM C33.

1. Fine Aggregate: (Refer to Section 31 05 16).
2. Coarse Aggregate: Gradation 67 (Refer to Section 31 05 16).

C. Water: Potable, not detrimental to concrete.

D. Air Entrainment: ASTM C260.

E. Chemical Admixture: Conforming to ASTM C494: non-chloride accelerating admixtures shall be used.

F. Color Pigment: ASTM C 979/C 979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

G. Other admixtures only with the written approval of Engineer.

2.04 ACCESSORIES

A. Joint Sealers: Polyurethane elastomeric sealant for filling joints. Acceptable products Sikaflex 2C NS/NL or approved equivalent.

B. Concrete Curing Materials: Shall conform to the following standards:

1. Cotton mats for curing concrete; AASHTO M73
2. Burlap cloth made from jute or kenaf: AASHTO M182.
3. Waterproof paper for curing concrete: AASHTO M139.
4. Liquid membrane forming compounds for curing concrete: AASHTO M148.
5. White polyethylene sheeting (film) for curing concrete: AASHTO M171.

C. Form Coating Materials: Shall be light commercial oil or other suitable substance that will prevent adherence of the concrete to the forms and will not reduce the strength of the concrete. In addition, the materials used for treating forms that will be in contact with concrete surfaces that are exposed to view in the finished work shall be a substance that will not appreciably affect the color of the concrete.

2.05 CONCRETE MIX - BY PERFORMANCE CRITERIA

A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.

B. Provide concrete to the following criteria:

1. Concrete Mix obtaining a minimum 28-day compressive strength of 4,000 psi and minimum 7-day and 28-day moduli of rupture (AASHTO T97) of 500 and 600 psi, respectively.
2. Maximum water/cement ratio of 0.47.
3. Air content between 5 and 8 percent.
4. Maximum slump of 3-inches.
5. Minimum cement content of 564 lbs./cubic yard.
6. Type C Fly Ash meeting ASTM C618 may be used to replace cement on a 1:1 ratio, up to a maximum of 30 percent by weight.

2.06 EQUIPMENT

A. Equipment and tools necessary for handling materials and performing all parts of the Work shall be sufficient as to design, capacity, and mechanical condition. The equipment shall be at the job site sufficiently before the start of construction operations.

2.07 SOURCE QUALITY CONTROL AND TESTS

A. Section 01 45 00 - Quality Control: Provide concrete mix design and testing and analysis of aggregate material.

B. Contractor shall submit samples, obtain aggregate gradation analyses, and submit for Engineer's approval. Minimum frequency for aggregate gradation analyses shall be one test per 1,000 tons of concrete mix produced or fraction thereof.

C. Coarse Aggregate Material – Testing and Analysis: Perform in accordance with ASTM C136.

D. Fine Aggregate Material – Testing and Analysis: Perform in accordance with ASTM C136.

E. If tests indicate materials do not meet specified requirements, change material or material source and retest.

F. Provide materials of each type from the same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions and that compacted subgrade is dry, stable, proper temperature, and compacted to specified density per City of Williston Specifications. Verify subgrade elevations are correct and at proper grade to receive concrete paving. Subgrade shall be prepared as shown on the Drawings.

B. Submit subgrade test results prior to placing concrete pavement.

C. Verify Work of others affected has been completed and will not be adversely affected by paving operations. Verify that elevations of manhole and valve box castings in street or sidewalk are correct. Verify that curb depressions for sidewalks and driveways have been accommodated. Verify that drainage pattern matches storm water intake locations.

3.02 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Adjust valve boxes, curb stops, manhole castings, and other utility structures to grade; coat manhole, catch basin, or other frames with oil to prevent bond with concrete pavement.

C. Notify Engineer minimum 24 hours prior to commencement of concrete delivery and placement.

3.03 FORM MATERIALS

A. Comply with ACI 301.

B. Curb and gutter shape shall conform to the dimensions shown on the Drawings.

C. Concrete curb shall be recessed for handicap ramps where sidewalks cross the street.

D. Use approved flexible forms on all curves where the radius is less than 20 times the length of the form.

E. In the event of rain, forms shall be removed and reset as may be necessary to comply with above requirements.

F. Clean forms prior to placement. Place and secure forms to correct size, location, dimension, profile, and gradient for sidewalk, driveway, and roadway paving thickness shown on the Drawings and for curbs and gutters.

G. Forms shall have a height equal to the edge thickness of the sidewalk or pavement slab. Assemble formwork to fully support loading exerted by concrete placement and finishing operations without deflection, displacement, or settlement and to permit easy stripping and dismantling without damaging concrete. Forms shall be well oiled on the contact faces. Use light commercial oil or other suitable substance that will prevent adherence of the concrete to the forms and will not reduce the strength of the concrete.

H. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required, to prevent leakage.

I. Place no concrete until Engineer/Owner has approved subgrade and forms. Forms for paving shall be set to the proper alignment and grade for a distance equal to at least 3 hours paving time prior to Engineer approval.

J. Moisten forms and subgrade immediately before placing concrete.

K. Do not disturb or remove forms until the concrete has hardened sufficiently to permit removal with complete safety or unless otherwise approved by Engineer. Remove forms only during daylight hours and in a manner that avoids damage to pavement and curbs.

3.04 REINFORCING

A. Steel Reinforcement:

1. Comply with ACI 301 and placement shown on the Drawings. Reinforcement shall be clean and free of rust scale, shall be of the type, style, and dimensions shown on the Drawings.
2. Place reinforcement as shown on Drawings within a tolerance of plus or minus ½ inch.

3.05 PLACING CONCRETE

A. Preparation:

1. Place no concrete until subgrade preparation, forms, and reinforcement have been inspected and approved and until elevations of castings have been verified.
2. Before placing concrete, thoroughly clean forms, wash out with water, and make tight. Sweep and wash all adjacent sidewalks next to the pour, so as to eliminate contamination from remaining debris.
3. Concrete in streets, sidewalks, parking lot, etc. are to be of the thickness as indicated on the Drawings.
4. Deposit concrete in a manner to form a continuous, full-width mass requiring a minimum of rehandling and/or redistribution and to a sufficient depth to provide excess for finishing operations.
5. Do not dump or discharge concrete on or against a joint, reinforcement, insert, embedded part, or other assembly in a manner causing displacement or damage of the assembly.
6. Before new concrete is deposited upon or against concrete that has taken its initial set or has hardened, remove all encrustations from forms and reinforcement.

B. Method of Placing.

1. Do not place concrete outside of regular working hours, unless Engineer has been notified properly and is present.
2. Do not permit concrete to drop freely more than 6 feet. The concrete shall be placed in forms by means of a chute or hand shoveling.
3. Deposit concrete so that the surface is kept level throughout, a minimum being permitted to flow from one position to another, and place as rapidly as practicable after mixing.
4. Do not use in this Work any concrete not placed within 30 minutes after leaving the mixer.
5. If concrete placement is suspended for 30 minutes or less, cover the unfinished forward face of placed concrete with wet burlap until placement operations resume. When operations resume, break down

forward face of placed concrete and thoroughly merge with fresh concrete. Continue consolidations and finishing operations on placed concrete throughout suspension period.

6. Do not break or interrupt successive pours such that cold joints occur. If the suspension of concrete placement exceeds 30 minutes, a standard head joint shall be constructed; provided, however, that no header joint will be permitted within a distance of 10 feet from any adjacent transverse joint.

C. Consolidating

1. Consolidate concrete by an approved mechanical vibrator using a uniform rate of forward progress as soon as possible after placement of concrete on subgrade. Vibrate only once thoroughly and uniformly consolidate concrete throughout its entire depth and width without damaging or displacing joint assemblies and reinforcing. Segregation of concrete or undesirable water gain in the upper pavement zone due to excessive vibration will not be permitted. Suspend vibration whenever the forward progress of the machine is interrupted. Hand-held vibratory equipment is not approved unless Contractor demonstrates that adequate manpower is dedicated to consolidation operations and Engineer approves Contractor's plan and manpower commitment in writing. Engineer may require the use of hand-held vibrators along the edge of existing pavement and curb. Suspend concrete paving if vibratory equipment failure occurs.
2. Thoroughly work concrete around reinforcements, and embedded fixtures, and into corners of forms during placing operations.

3.06 JOINTS

A. Intervals, type, and dimensions shown on Drawings; firmly support rebar off subgrade with chairs. Where jointing plan is not shown, prepare and furnish jointing plan for review and approval of Engineer.

B. Construct joints straight and at right angles to pavement surface. Where practical, all joints shall align with like joints in adjoining work. Use joints to outline all panels in sidewalks, making panels square insofar as possible. Maximum joint spacing in feet shall be 1.5 times pavement thickness in inches. Maximum length of panel shall be 1.5 times width.

C. When placing concrete adjacent to existing working joints, Contractor shall use jointing techniques that will prevent random cracking of new pavement surfaces. Techniques may include soft sawing, placing pre-molded strips, or other approved methods.

D. After the curing period, joints to be dried and sand cleaned prior to installation of joint material; seal with hot pour material meeting requirements of the City of Williston's “Standard Construction Specifications;” slightly underfill joints by approximately 1/8 inch and remove excess seal material immediately.

E. Transverse joints: at right angles to pavement and north/south Parking Lot centerline:

1. Match existing transverse joints.
2. Saw cut 3/16 inch contraction joints to a depth of ¼ slab depth at optimum time after finishing to prevent formation of uncontrolled cracks due to contraction of slab;
3. Provide construction joints as shown on Drawings and when concrete placement is suspended more than 30 minutes; no transverse construction joints shall be allowed between normal contraction joint locations; Contractor shall lay out joint locations to ensure that construction joints do not occur at prohibited locations.

F. Longitudinal joints: parallel to pavement centerline and north/south Parking Lot centerline.

1. Match existing longitudinal joints.
2. Placed as shown on Drawings; saw cut 3/16 inch contraction joints to a depth of ¼ slab depth at optimum time after finishing to prevent formation of uncontrolled cracks due to contraction of slab.
3. Construct longitudinal construction joints, if required, as shown on Drawings. The key shall be constructed by placing a deformed metal plate against the form when the first lane adjacent to the joint is placed. Remove this metal plate with the form. When placing the second slab, no concrete shall be left to overhang the lip formed on the first slab by the edging tool. Before placing the second slab, the entire edge of the first slab shall be sprayed with concrete form oil to completely break the bond between adjacent slabs.

G. Isolation joints: use to separate thickened edge sidewalk from parking lot and adjacent curb and gutter. Joint shall be full depth of pavement and dimensions shown in Drawings; when extending full width of 5-foot wide or wider pavement, increase depth 2-inches.

1. Sidewalk isolation joints; 5/8-inch wide and full slab thickness; premolded or poured material.

3.07 FINISHING

A. When irregularities are discovered, they shall be corrected by adding or removing concrete. The pavement surface shall have no depression in which water will stand.

B. Ensure that paving grade has a minimum slope of 0.4 percent.

C. Street Pavement: Finish and texture street pavement transverse to pavement centerline so that finished elevations match existing street surfaces.

D. Brooms shall be clean and free of dry or hardened mortar.

E. Finishing Schedules:

1. Streets and Parking Lot: Surface shall be left slightly rough, with a uniformly tined finish. Streets shall be true to line and grade for existing concrete pavement street sections.
2. Driveways and aprons: Light broom texture parallel to centerline of street and curb and gutter, true to line and grade. The surface shall be slightly rough but uniform.
3. Sidewalks: Floated smooth and immediately after the water sheen disappears, broom lightly perpendicular to centerline followed by troweling joint edges. Use a clean broom at least 24 inches long and having three rows of bass, bassine, or coire fibers. Broom fibers shall be free of dry or hardened mortar from previous use. After final floating, apply the following finish:
    a. Medium-to-Fine-Textured Broom Finish: Finish for non-decorative concrete. Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.
    b. Medium-to-Coarse Textured Broom Finish: Finish for non-colored and colored scored concrete. Provide a coarse finish by striating float-finished concrete surface 1/16” to 1/8” deep with a stiff-bristled broom, perpendicular to line of traffic.
4. Curb and gutters: light broom.

F. Finishing Tolerances:

1. The true plane of the surface shall not vary more than 1/4 of an inch in 10 feet, as determined by a 10 foot straightedge placed anywhere on the slab in any direction.
2. Produce an initial surface which is relatively free from defects, but which still may show some trowel marks.
3. Provide a finished surface essentially free from trowel marks, uniform in texture and appearance, and in a plane of tolerance specified.

3.08 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature curing, sun, wind, excessively hot or cold temperatures, travel, and mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

B. When removal of formwork occurs before concrete has totally cured, concrete shall be protected from premature drying by covering with polyethylene sheeting.

C. Cure all horizontal surfaces with wet cure or polyethylene film.

D. Cure concrete by covering all exposed surfaces immediately after finishing for at least 30 hours with curing paper or plastic curing blanket or by application of a liquid-membrane curing-compound.

E. When liquid membrane curing compound is used, apply at a rate of at least one gallon per 150 square feet in two equal applications 30 minutes apart. Protect joints to be sealed from entry of curing compound.

F. The Contractor shall insure that the concrete has developed the necessary strength before forms are removed. Apply curing compound to exposed concrete after removal of forms.

G. Promptly repair damaged curing compounds, paper, or blankets during the 30-hour curing period.

H. Prevent the temperature of deposited concrete from falling below 50 degrees F. until at least 30 hours of curing has taken place. Engineer may, at his/her discretion, extend this curing time for cold weather operations.

I. Power equipment shall not operate on a pavement slab until it has attained a modulus of rupture flexural strength of 550 psi. Engineer’s written approval shall be required prior to equipment access onto pavement. In the event of damage to concrete resulting from the equipment or operations, suspend operation and correct damage. Contractor shall be responsible for any damage to pavement caused by his equipment or operations, regardless of Engineer's approval.

J. New pavement shall not be opened for traffic until the joints have been sealed. New pavement may be opened to use by the general public vehicles when the concrete has attained a modulus of rupture flexural strength of 550 psi, provided pavement is in condition for safe use. Vehicular access limitations at colder temperatures will be extended at the Engineer's discretion; consult Engineer before allowing vehicle access.

K. Clean up paving area.

3.09 DEFECTIVE CONCRETE

A. The following concrete will be deemed to be defective, poor in quality standards, and shall be removed and replaced promptly from the job site at no additional expense to the Owner.

1. All concrete which is not formed as indicated, is not true to intended alignment, is not plumb or level where as intended, is not true to intended grades and levels;
2. Has voids, honeycombs, or spalling that have been cut, resurfaced, or filled, unless with the approval of the Engineer;
3. Has uncontrolled cracks greater than 1/32 inch in width.
4. Has sawdust, shaving, wood, dirt, rocks, or other embedded debris;
5. The flow line surface of gutters not finished and shaped as necessary to eliminate low spots and entrapment of water;
6. The top surface of the curbs, gutters, and curb radius shall be free from humps, sags, and other irregularities, shall be constructed to the elevations and widths shown in the Drawings and shall have edge alignment as straight as practicable on tangent sections and of uniform curvature on curved sections;
7. Or does not conform fully to provisions of the contract documents.

B. Repairs and Replacements:

1. Where defective concrete is found after removal of the forms, cut it out, if necessary, and make the surfaces match adjacent surfaces.

3.10 FIELD QUALITY CONTROL

A. Section 01 45 00 – Quality Control: Field inspection and laboratory testing.

1. Perform field and laboratory testing by an independent testing laboratory retained and paid for by the Contractor.

B. Perform one (1) field slump, one (1) air entrainment, two (2) 7-day and two (2) 28-day cylinder compression tests, and two (2) each 7-day and 28-day beam modulus of rupture tests for standard concrete in accordance with ACI 301 on the following schedule. Minimum testing frequency shall be the greater number of tests determined by the following criteria: 1) Once per day of paving operation, 2) Once per 75 cubic yards or fraction thereof. When ambient temperatures are below 45 degrees, one additional test cylinder shall be molded, cured on site under the same conditions as concrete it represents, and subsequently tested for 28-day compressive strength. Notify testing laboratory to perform tests when testing is to be performed during construction. Do not proceed with additional work until 7-day modulus of rupture results have been verified.

C. Provide computer generated batch tickets showing the weight of each component in the concrete mixture and the batching time with each batch of concrete delivered to the project. Contractor shall collect the batch ticket from each load delivered and shall deliver the batch tickets to the Engineer at the end of each day.

D. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature (3 times daily), and test samples taken.

E. If, during progress of Work, tests indicate that concrete paving materials do not meet specified requirements, remove defective Work, replace and retest. Contractor to bare all costs associated with defective pavement work.

3.11 WORKMANSHIP AND TOLERANCES

A. Flatness: Maximum variation of measured with a 10-foot straight edge shall be ¼ inch for pavement slabs and 1/8 inch for sidewalks.

B. Scheduled thickness: Within ¼ inch of specified thickness.

C. Variation from true elevation: Within ¼ inch.

D. Transverse slope of surface course shall not vary from the slope shown on Drawings by more than plus or minus ¼ inch in 12 feet.

3.12 SCHEDULE

A. Concrete Pavement: As indicated on drawings.

B. Curb and Gutter: As shown in details, or to match existing cross section.

END OF SECTION

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SECTION 32 15 00
AGGREGATE SURFACING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Aggregate surfacing, grading, and compacting.

B. Related Sections include, but are not limited to:

1. Section 01 22 00 - Unit Price Measurement and Payment.
2. Section 01 45 00 - Quality Control.
3. Section 31 05 16 - Aggregates for Earthwork.
4. Section 31 23 23 - Fill and Backfill
5. Section 31 23 33 - Trenching and Backfilling.
6. Section 32 90 00 - Landscape Grading.

1.02 REFERENCES

A. Reference Standards include, but are not limited to:

1. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Methods for Laboratory Compaction
3. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
4. Standard Specifications for Road and Bridge Construction, latest edition, by North Dakota Department of Transportation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Surface Coarse Aggregate Type A2: As specified in Section 31 05 16.

B. Base Coarse Aggregate Type A3: As specified in Section 31 05 16.

C. Drainage Coarse Aggregate Type A4: As specified in Section 31 05 16.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify substrate has been inspected, gradients and elevations are correct, and substrate is dry.

B. Verify structure and trench backfilling have been inspected.

C. Verify subgrade base has been contoured and compacted.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying a minimum of 6 inches, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 AGGREGATE PLACEMENT

A. Spread aggregate over prepared subgrade to a total compacted thickness of 6 inches.

B. Place aggregate in maximum 3-inch layers and compact to specified density.

C. Level and contour surfaces to elevations and gradients indicated on Drawings.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Add water to assist compaction as necessary. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Flatness: Maximum variation of 1 inch measured with 10-foot straight edge.

B. Scheduled Compacted Thickness: Within ¼-inch.

C. Variation from Design Elevation: The finished surface shall not vary from the prescribed cross section elevation by more than ½-inch.

3.05 FIELD QUALITY CONTROL

A. Section 01 45 00 - Quality Control: Field inspection.

B. Compaction testing will be performed in accordance with ASTM D698 and ASTM D6938.

C. Gradation testing will be performed by performing sieve analysis in accordance with ASTM C136.

D. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest at no additional cost to Owner.

E. Frequency of Tests:

1. Gradation Testing: One test for every stockpile of material or 1,000 tons of material.
2. Compaction Testing: Testing will only be required if tolerances are not being met.

END OF SECTION

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SECTION 32 39 14
SIGNAGE AND BOLLARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnishing and installation of all traffic regulatory and informational signage to include those identified on the drawings.

B. Furnishing and installation of all protective bollards shown on the drawings.

C. Marker signs with post.

D. Related Sections include:

1. Section 01 33 00 – Submittal Procedures.
2. Section 01 45 00 – Quality Control.
3. Section 33 10 00 – Water Utilities.

1.02 REFERENCES

A. North Dakota Department of Transportation Standard Specification for Road and Bridge Construction, latest edition.

B. ASTM A153/A153M – Zinc-Coated (Hot-Dip) on Iron and Steel Hardware.

1.03 SUBMITTALS

1. Shop Drawings: Furnish in accordance with Section 01 33 00.
2. Product Data: Provide data on composite posts, decals, accessories, and hardware.

1.04 REGULATORY REQUIREMENTS

A. Conform to all applicable City, State, and Federal Standards for signing.

PART 2 PRODUCTS

2.01 WATER PIPE/ VALVE MARKER SIGNS AND POSTS

A. Manufacturers:

1. Carsonite International.
2. Approved Equivalent.

B. Materials and Components

1. Conforming to CUM-375 Composite Utility Marker

2. Width: 3.75 inches.
3. Length: 6.6 feet.
4. Color: Post shall be APWA specified Purple, with reflective decals on blue background with white lettering.
5. Lettering shall be as detailed on the Drawings.

C. Provide with one post puller and utility marker driver.

2.02 HYDRANT MARKER SIGNS AND POSTS

A. Hydrant markers shall be mounted on both side of the post to face traffic (perpendicular to the road) and shall be installed at each hydrant.

B. Materials

1. Post: Green U-channel - 2 lb. per foot & 9 feet long with a 2 foot bury.
2. Sign: Shall be 18" x 18" x 0.063" aluminum covered with Engineer Grade reflective sheeting and red text on white background that reads: ""FOR FLUSHING OF WATER LINE; NOT FOR FIREFIGHTING USE".

C. Cost shall be incidental to the hydrant installation.

2.03 BOLLARDS

A. Bollards shall be furnished and installed in the locations and in conformance with the details shown in the Drawings.

B. Concrete for foundations shall be 3,000 psi minimum.

C. Bollards shall be constructed of structural steel and shall be filled with concrete.

D. Bollards shall be painted with prime coat and two finish coats of color selected by Owner/Engineer.

E. Plastic protective sleeve shall be furnished and installed when indicated on Construction Details.

2.04 CAPPED PIPE MARKER POSTS

A. Each capped pipe location, as indicated on the Drawings, shall be marked by a buried rebar and a steel T-Post.

B. Materials:

1. Rebar: 2 feet in length, #4 in size, placed horizontally and buried at a depth of 6-inches from finished ground.
2. T-Post: 2 pound per foot and 9 feet long with a 2 foot bury.

C. Cost shall be incidental to the pipe installation.

D. The Contractor shall fabricate and install steel sign posts for all signs per NDDOT Section 894.05 and the details in the Drawings. Materials shall include the sign post, anchor, sleeve plates, shims, bolts, washers and other miscellaneous hardware required to provide a complete installation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install marker posts at the locations and to the lines delineated on the Drawings and in accordance with manufacturer's recommendations.

B. Plumb posts straight, true-to-line, and properly positioned.

C. Attach decals securely to posts at locations as indicated on drawings.

D. Provide 10 additional decals of each type to Owner as spare parts.

E. Install bollards in a rigid and substantial manner following the details provided in the drawings.

3.02 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/2 inch.

B. Maximum Offset From True Position: 2 inches.

C. Components shall not infringe adjacent property lines.

END OF SECTION

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SECTION 32 90 00
LANDSCAPE GRADING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes

1. Topsoil Placement.
2. Finish Grading of Topsoil.

B. Related Sections

1. Section 01 22 00 – Unit Price Measurement and Payment.
2. Section 01 45 00 – Quality Control.
3. Section 31 05 13 – Soil for Earthwork.
4. Section 31 05 16 – Aggregates for Earthwork.
5. Section 31 11 00 – Clearing and Grubbing.
6. Section 31 14 13 – Soil Stripping and Stockpiling.
7. Section 31 23 23 – Fill and Backfill
8. Section 31 23 33 – Trenching and Backfill
9. Section 32 92 19 – Seeding.
10. Section 32 97 00 – Restoration of Disturbed Area.
11. Section 33 10 00 - Water Utilities.

PART 2 PRODUCTS

2.01 MATERIAL

A. Topsoil: Fill Type S4 as specified in Section 31 05 13.

B. Subsoil: Fill Type S1 or S2 as specified in Section 31 05 13.

C. Provide source testing data in accordance with Section 01 45 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey benchmark and intended elevations for the Work are as indicated.

B. Verify structure and trench backfilling have been inspected.

C. Verify substrate base has been contoured and compacted.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Remove debris, roots, branches, and stones in excess of 2 inches in size. Remove subsoil contaminated with petroleum products.

C. Contractor shall be responsible for coordinating with all utility companies for location of buried utilities prior to excavation. Locate, identify, and protect all utilities that remain, from damage.

D. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

E. Protect benchmarks, survey control points, and existing structures, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

F. Provide proper erosion and sediment control for all grading operation.

3.03 ROUGH GRADING

A. Subgrade Preparation and fill below paved and landscaped areas:

1. Fill Type S1 or S2 as specified in Section 31 05 13, compacted to 95% of Standard Proctor maximum dry density (ASTM D698), and within +/- 3% of optimum moisture content.
2. Lifts shall be no thicker than 9-inches prior to compaction. In the top 24-inches, lifts shall be no thicker than 6-inches.

B. Eliminate uneven areas and low spots.

C. Scarify subsoil surface to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

D. Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth finish surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

E. Rough grade areas adjacent to structure lines to drain away from structures and to prevent ponding or increase in soil lateral pressure on the structure.

3.04 FINISH GRADING

A. Contractor shall provide the degree of finish grading that will be normally obtainable through the use of suitable equipment operated under favorable

conditions and by an experienced operator. Deviations from the required tolerance shall be corrected by the Contractor at no additional cost to the Owner.

3.05 PLACING TOPSOIL

A. Place topsoil in areas where seeding and restoration is required to a nominal depth of 6 inches. Place topsoil during dry weather.

B. Use imported topsoil in urban areas as a supplement to excavated topsoil only when a 6 inch depth is unable to be maintained.

C. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.

D. Remove roots, weeds, rocks, and foreign material while spreading.

E. Manually spread topsoil close to plant life and buildings to prevent damage.

F. Lightly compact placed topsoil.

G. Remove surplus subsoil and topsoil from site. Contractor shall pay for loading, hauling, and spreading of all excess topsoil materials removed from the site or placed and spread on-site by direction of Owner or Engineer.

H. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.06 TOLERANCES

A. Top of Topsoil: Plus or minus 1 inch.

3.07 PROTECTION

A. Protect landscaping and other features remaining as final Work.

B. Protect existing structures, fences, sidewalks, utilities, paving, and curbs.

END OF SECTION

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SECTION 32 92 19
SEEDING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Seeding of all areas disturbed during construction.

B. Related Section include:

1. Section 01 22 00 – Unit Price Measurement and Payment.
2. Section 01 31 13 – Project Coordination.
3. Section 01 33 00 – Submittal Procedures
4. Section 01 45 00 – Quality Control.
5. Section 31 05 13 – Soils For Earthwork.
6. Section 31 11 00 - Clearing and Grubbing
7. Section 31 14 13 – Soil Stripping and Stockpiling.
8. Section 32 90 00 – Landscape Grading.
9. Section 32 97 00 – Restoration of Disturbed Areas.

1.02 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Leafy Spurge, and Perennial Sorrel.

1.03 QUALITY ASSURANCE

A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.04 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for herbicide composition.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of seed mixture.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers, open or damaged packaging is not acceptable.

1.06 COORDINATION

A. Coordinate work under provisions of Section 01 31 13.

PART 2 PRODUCTS

2.01 MATERIALS

A. Seed shall be furnished in labeled, standard containers. Seed that has become wet, moldy, or otherwise damaged will not be acceptable. All seed shall be endophyte enhanced unless noted. The pure live grass seed mixture to be used shall be as follows:

1. Type I - used for residential yards
2. Type II - used for commercial green spaces and reservoir sites
3. Type III - used for ditches/legal drains
4. Type IV - used for CRP, Grassland Easement, Forest Service Land, and WPA Areas, contact local NRCS for seed mixture and variety
5. Type V - used for alfalfa crop areas
6. Type VI - used as noted on plans and as noted here:

B. Seed tags shall be provided with each bag of seed used on the project and shall be given to the engineer. Certifications shall be provided with each bag of seed used on the project. Certifications shall be provided upon request. Labels (seed tags) for seed shall contain the following:

1. Name and address of supplier
2. Lot Number
3. Origin for each kind of seed
4. Purity percentage and germination for each kind of seed
5. Date of last test
6. Pounds of bulk seed and pure live seed for each type of seed and for total mix in each bag.

C. Fertilizer – Fertilizer shall be a commercial product; partly derived from organic sources and a nitrogen-phosphorous-potassium combination as shown in the schedule above. Fertilizer shall be free flowing and suitable for application with mechanical equipment, delivered in sealed containers, each fully used and bearing the name, trade-name or trademark and warranty of producer.

D. Vegetative Mulch (Type A) - Vegetative mulch shall be composed of straw only. Straw shall be harvested stalks of oats, wheat, barley, or rye. 50% of which shall be 10 inches long or longer. Material shall be sufficiently moist to prevent anchoring without breaking. Mulch shall be applied at a rate of 2 tons per acre. This is to be utilized at contractors discretion.

E. Hydro-Mulch (Type B) – The mulch shall be uniformly applied at a rate of one ton per acre and shall cover the entire seedbed area up to 95%. The mulch shall permit the percolation of water to the underlying soil. The mulching shall consist of a wood cellulose fiber (strands) that has not been treated with any germination or growth inhibitive substances. The mulch shall be treated with a tackifier to enhance mulch placement and adherence to the soil. The mulch shall contain no foreign matter or noxious substances or seeds that would be detrimental to seed growth. No sawdust byproduct mulch will be allowed. This is to be utilized at contractors discretion.

F. Topsoil – If new topsoil is specified, it shall be essentially free of subsoil, organic debris, objects larger than two (2) inches in diameter, substances harmful to plant growth and any other material detrimental to grading, seeding or sodding, and maintenance operations. It shall be of the sandy loam type unless otherwise specified.

PART 3 EXECUTION

3.01 INSTALLATION

A. Preparation of Seedbed –

1. All debris, vegetation, and stones larger than 2 inches in diameter shall be removed from the site. Ground surfaces shall conform to plan grades. The ground shall then be tilled to a depth of 4 inches, the surface after which shall be free from lumps and irregularities. If perennial weeds of any kind are present before tilling, they shall be controlled by the application of a pre-emergence herbicide at least 2 weeks before seeding. Two applications shall be required. This shall not be allowed, however, within 200 feet of streams, rivers, legal drains, or wetlands.
2. Prepare topsoil for seeding by cultivating and raking as recommended by seed supplier. Remove soil lumps or debris larger than 3 inches.

B. Planting Seed –

1. Seeding shall be done between the dates of April 15th and June 1st or September 1st and October 1st. Any planting done between the dates of June 1st and September 1st shall be done so with permission in writing only and then only by the addition of 10 pounds of oats per acre to the specified amount of seed. The addition of oats shall be at the contractor's expense. Dormant fall seeding will be allowed with approval from the Engineer. Typical times of dormant seeding are from late October to early November with the soil temperatures reach less than 50 degrees F. Consult the North Dakota Agricultural Weather Network website for soil temperatures.

2. Apply seed and companion crop evenly and in two (2) intersecting directions (where applicable). Seed shall be sown by uniformly drilling with a brillion-type seeder. Rake or harrow in lightly.
3. Uniformly distribute over areas to be seeded using a press drill with depth control bands and grass seed attachment. If furrow spacing exceeds 9 inches, drill seeded area twice.
4. Drill cross slope.
5. Provide packer wheels to firm soil over seed.
6. Plant to a depth of 1/4 to 1/2 inch.
7. Seed spoil areas, disturbed areas on site and along project pipeline routes previously grass covered, and all other areas within the Project site areas devoid of vegetation or that have unsuitable vegetation as a result of construction activities. Seed haul roads and other disturbed areas outside the Project limits and/or easements.
8. Do not sow immediately following rain, when ground is too dry, or during winds that are strong enough (as determined by the engineer – usually above 15 mph) to prevent it from being properly embedded in the surface.
9. Perform seeding after grading of seedbed surfaces has been completed.
10. Straw Mulching – The area shall be raked or dragged after seed placement to the satisfaction of the engineer before mulch placement. The mulch shall be placed within 24 hours after the seeding has been completed. This operation shall not be done in high winds that prevent the mulch from being properly placed. Mulch that contains excessive moisture shall not be used if it prevents uniform feeding through machine. Bales shall be broken up and loosened as they are fed into blower to avoid placement of matted or unbroken lumps. The mulch shall be machine blown and shall be uniformly spread over seeded areas. Excessive cover shall be avoided. Punching or asphalt shall anchor mulch.
11. Punching – Mulch shall be punched immediately after application into soil using a mulch tiller consisting of a series of dull, flat disks with notched or cutout edges. The disks shall be approximately 20 inches in diameter, ¼ inch thick, spaced approximately 8 inches apart, and shall be fitted with scrapers. The tiller shall be operated on contour, except on slopes steeper than 3:1 where diagonal operations are required using a tractor with dual drive wheels or crawler tread on the tractor to minimize sideslip and rutting slopes. Tiller members shall be able to push the mulch into the soil 3 inches with ends of the mulch exposed above the soil surface.
12. Asphalt – Emulsion shall be applied with mulch or by spraying surface immediately after mulching. Emulsion shall be applied at a rate between 225 and 275 gallons per acre. All structures and miscellaneous items shall be protected from being marked or splattered.

C. Reseeding and Repair - Any area in which the seed does not take, or in which erosion has occurred shall be repaired and reseeded until the desired result is obtained. If erosion is prevalent, utilize Hydro-Mulch as defined in Part 2.01 of this section.

D. Water - Water for seed is not available on site. The contractor shall water areas seeded as necessary to achieve the required growth. This shall be considered incidental to this item. Watering the seed shall be done by the contractor for a period of 8 weeks after seed has been sown.

E. Fertilizer - Fertilizer placement shall be done prior to seeding. For any seeding type specified, the fertilized area shall be thoroughly watered 24-48 hours after fertilizing.

F. Topsoil - Salvaging and reusing existing topsoil will be required unless a separate bid item is included in the bid schedule or other items are stipulated in the plans or Measurement & Payment section of the specifications. Topsoil shall be spread on all areas to be seeded.

3.02 FIELD QUALITY CONTROL

A. It shall be the contractor's responsibility to ensure that the seed grows adequately (which is defined as attaining a seeded grass growth of 15 plants (seedlings) per square foot for all seeded areas.)

B. Reseed non-compliance areas until proper growth is attained.

C. Control growth of weeds. Apply herbicides in accordance with manufacturer’s instructions. Remedy damage resulting from improper use of herbicides.

END OF SECTION

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SECTION 32 97 00
RESTORATION OF DISTURBED AREAS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Restoration of all areas disturbed during construction.
2. Restoration of all items not specifically identified for restoration, but damaged through construction.

B. Related Sections include, but are not limited to:

1. Section 01 77 00 – Closeout Procedures.
2. Section 31 05 13 – Soils for Earthwork.
3. Section 31 05 16 – Aggregate for Earthwork.
4. Section 31 11 00 – Clearing and Grubbing.
5. Section 31 23 16 – Excavation.
6. Section 31 23 23 – Fill and Backfill.
7. Section 31 23 33 – Trenching and Backfill.
8. Section 31 25 00 – Erosion and Sedimentation Control.
9. Section 32 15 00 – Aggregate Surfacing.
10. Section 32 90 00 – Landscape Grading.
11. Section 32 92 19 – Seeding.
12. Section 33 10 00 – Water Utilities.

PART 2 PRODUCTS

2.01 MATERIALS

A. Material Sections include:

1. Topsoil and Subsoil: Per Section 31 05 13.
2. Aggregate Materials: Per Section 31 05 16.
3. Seeding: Per Section 32 92 19.

PART 3 EXECUTION

3.01 EXECUTION

A. Observe all surface features requiring protection, removal and replacement, and/or restoration prior to construction.

B. The Contractor shall be responsible for the preservation of all public and private property and shall protect carefully from disturbance or damage all land

monuments and property marks until the Engineer has witnessed or otherwise referenced their location and shall not move them until directed.

C. The Contractor shall be responsible for all damage or injury to property of any character during the prosecution of the Work, resulting from any act, omission, neglect, or misconduct in this manner or method of executing the Work, or at any time due to defective Work or materials, and said responsibility will not be released until the Project shall have been completed and accepted.

D. When any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the Work, or in consequence of the non-execution thereof by the Contractor, he shall restore, at his own expense, such property to the condition similar or equal to that existing before such damage or injury was done by repairing, rebuilding, or otherwise restoring as may be directed or he shall make good such damage or injury in an acceptable manner.

3.02 RESTORATION

A. Restore all areas disturbed by construction to a condition equal to or better than existed prior to construction.

B. Replace, restore, repair, or otherwise make good any damage done to any tree, bush, or shrub that is not specifically designated for removal.

C. Restore items such as culverts, road signs, power poles, sodding, fences, driveways, mailboxes, and like, whether or not specifically identified on the drawings, to a condition equal to or better than existed before construction.

D. Replace or repair all concrete or asphalt driveways, concrete sidewalks, and curb and gutter removed or damaged during construction with equal or better materials. Replace or repair to match existing conditions.

E. Stabilize subgrade sufficiently to prevent mixing of granular material with subgrade prior to application of base material.

F. Place topsoil per Section 31 05 13 and seed areas disturbed by construction in grassed areas per Section 32 92 19.

G. Prior to re-opening any section to full public access, all sidewalks, driveways, curb ramps, and curb and gutter shall be installed.

H. All damage to streets, driveways, berms, etc. due to the Contractor’s construction techniques and equipment shall be repaired at the Contractor’s expense prior to final payment.

I. Remove all excess dirt, concrete, and other debris from project site immediately upon completion of Work. Contractor shall be required to clean site to the condition prior to the start of construction before final payment will be made.

END OF SECTION

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DIVISION 33
UTILITIES

SECTION 33 05 07
TRENCHLESS INSTALLATION OF UTILITY PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cased bores.
2. Directional bores

B. Related Sections:

1. Section 01 22 00 – Measurement and Payment.
2. Section 01 31 13 – Project Coordination.
3. Section 01 33 00 – Submittal Procedures.
4. Section 01 45 00 – Quality Control.
5. Section 01 77 00 – Contract Closeout.
6. Section 01 78 23 – Operation and Maintenance Data
7. Section 33 10 00 – Water Utilities.
8. Section 33 13 00 – Disinfection of Water Systems.
9. Section 33 15 00 – Pipeline Pressure and Leakage Testing.

1.02 REFERENCES

A. Reference Standards include:

1. AASHTO T 180- Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
3. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
4. AWWA C200 – Standard Specifications for Steel Water Pipe 6 Inches and Larger.
5. AWWA C206 – Standard Specifications for Field Welding of Steel Water Pipe.
6. AWWA M11 – Steel Pipe-A Guide for Design and Installation.
7. ASTM A36/A36M – Carbon Structural Steel.
8. ASTM A139/A139M – Electric-Fusion (ARC) – Welded Steel Pipe (NPS 4 and over).
9. ASTM A283/A283M – Low and Intermediate Tensile Strength Carbon Steel Plates.

10. ASTM A572/A572M – High Strength Low-Allow Columbium-Vanadium Structural Steels.

1.03 SUBMITTALS

A. Submit per Section 01 33 00.

B. Product Data: Provide data on pipe, pipe fusion equipment and fusion process, couplers, drilling fluid(s), and accessories.

C. Submit qualifications and history of previous pipeline boring work completed of equivalent nature and scope (diameter, materials, length, and depth). Include qualification and experience of key personnel. Relevant qualifications can be found in Paragraph 1.05 of this Section.

D. Installation Plan: Submit description of proposed construction plan, plan to establish and maintain vertical and horizontal alignment within specified tolerances, plan to maintain borehole stability, and drilling fluid and mud recovery process, as applicable to boring method.

E. Submit for Engineer's approval prior to contruction, information on Contractor proposed grade control equipment including, but not limited to, equipment operation, accuracy, and capabilities to record and verify final grade.

F. Submit emergency response procedures to handle the following situations:

1. Conduit is compromised and jeopardizes integrity of installation or safety.
2. Boring process is interrupted by an obstruction such as a rock/boulder or other debris.
3. Bore hole abandonment process, if necessary.
4. Drilling fluid frack out or other major loss of drilling fluids.

1.04 CLOSEOUT SUBMITTALS

A. Submit per Section 01 33 00 and per Section 01 77 00.

B. Project Record Documents: Record actual bore hole configuration, invert elevations along pipe route, and locations of couplers connecting polyethylene (HDPE) pipe to PVC distribution or transmission pipeline at each end of bore.

1.05 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section with minimum five years documented experience.

1. Work Experience: Minimum of three projects of similar magnitude and conditions.
2. Furnish a list of references upon request.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Section 01 61 00 – Material and Equipment: Product Transportation and Handling, and Storage and Protection Requirements.

B. Protect piping from entry of foreign materials and water by temporary covers as sections of Work are completed and as isolated parts of the system are completed until final connections are made.

C. Support carrier pipes with nylon slings during handling; cables, chains, or ropes are not allowed.

D. Protect carrier pipe encasement materials from damage in handling.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable permits issued by governing agencies for installation of the Work of this Section.

B. Contractor is responsible for obtaining a copy of applicable permits from the Engineer and retaining a copy of applicable permits at the bore site throughout the duration of the work.

C. Conduct operations so as not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pipe Materials:

1. Refer to the following sections for pipe materials:
   a. Section 33 10 00 – Water Distribution: Watermain piping for non-cased bores shall conform to specifications set forth in Section 33 10 00.
   b. Shall conform to Section 33 10 00 as applicable for.
      a) Railroad cased bores.
      b) HDPE cased bores.
      c) Directional bores.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavation base is ready to receive work and that excavations, dimensions, and elevations are adequate for proper installation of utilities.

B. Notify and coordinate with all utility owners for location of buried utilities per State and local utility locate requirements prior to performing any boring activities. Contractor shall be responsible for all utility locate inquiries and shall be responsible for all damages to utilities due to lack of locate inquiry and coordination.

C. Verify location and elevation of existing utilities.

3.02 PREPARATION

A. Notifications: Provide notification to the Engineer a minimum of two (2) weeks before mobilizing onto the site. Provide notification two (2) weeks in advance of drilling. Provide notification 48 hours in advance of acceptance verification tests on pre-installed or installed product pipe.

B. Contractor shall develop the drilling fluid containment and drilling fluid pressure control system based on past construction experience and means and methods.

C. Identify required lines, levels, contours, and datum locations.

3.03 PITS OR APPROACH TRENCHES

A. Excavate approach trenches or pits in accordance with Section 31 23 33 – Trenching & Backfilling.

B. Contractor shall observe all OSHA requirements for trench safety.

3.04 INSTALLATION

A. General:

1. Trenchless installation of utility pipe methods shall be performed where indicated on Drawings or as directed by Engineer.
2. The boring machine shall be operated to prevent either surface heave, drilling fluid frack out, or loss of ground during boring. Drilling head shall be steerable and boring machine shall be capable of controlling the advance of the heading to maintain line and grade within the tolerances specified in the Paragraph 3.06 of this Section entitled “Settlement, Alignment, and Tolerances”.
3. Contractor shall continuously contain and properly dispose of all drilling fluids, drilling mud, and waste materials. Disposal or burial on-site will not be permitted.
4. Polyethylene pipe shall be allowed to set after being installed by directional bore method until such a time that the change in pipe length due to temperature change is minimized. Pipeline end connections shall not be made until temperature change period has been completed.

5. Casing and/or carrier pipe shall be installed by a trenchless boring method appropriate to the application.
6. In areas where limited amount of right-of-way or easement is available, half-lengths of carrier pipe of 10 feet may be used to limit size of bore pit(s).
7. The pipe shall be installed to the lines and grades required to maintain specified elevation for utilities. Provide recommended utility and other clearances as outlined in applicable permits from governing agencies or utility owners.
8. Pipe shall have a minimum of 90 inches of cover to top of pipe from finished grade. In locations of gravel and compacted driveways and parking lots, pipe depths shall be increased to a minimum cover of 96 inches.
9. Use tools and equipment of adequate size and capacity for installing pipe to insure Work will proceed continuously until complete.
10. The use of water as an aid in Cased Borings shall not be allowed.
11. Excavate, sheet, shore, brace, and dewater boring pits as necessary to provide safe work place.
12. Backfilling of boring pits, drilling fluid and mud handling pits, and entrance/exit points shall conform to Section 31 23 23.
13. Use rollers and ballast as recommended by pipeline manufacturer for each method of installation, type of pipe, size of pipe, pressure rating of pipe, and the length of the bore.

B. Railroad, Township, County, and State Road Crossings

1. The Contractor shall procure all other certificates, insurance, and licenses required by state, county, or local laws, ordinances, or rules, and regulations regarded to the performance of this Work. Additionally, any law, ordinances, insurance, training, regulations, and rules required by the particular railroad company shall be obtained or adhered to.
2. All railroad, asphalt or concrete highways, upgraded roadways, and streets will be installed via trenchless installation methods as specified and shall not be open cut. Bores will be paid for by one of the following methods:
    a. Directional Bore Installation.
    b. Cased Bore Installation.
3. State Highway Crossings
    a. Installed with polyethylene water pipe by trenchless installation methods as specified and shall comply with the regulations of the North Dakota Department of Transportation. The length of highway bores is shown on plans or will be determined by the Engineer's Field Representative as outlined in Section 01 22 00. Contractor may install additional polyethylene water pipe by this method for his convenience in crossing utilities or surface items that would require restoration; however, this pipe shall be paid for

at the unit bid price for watermain pipe installation by open cut methods.

b. Polyethylene Casing Pipe

1) Is required when crossing North Dakota State Highways; based on the requirements stated on the crossing's issued permit by the North Dakota Department of Transportation.

2) See Section 33 10 00 for casing pipe requirements.

3) Install as indicated on Drawings or as directed by Engineer.

c. Marker signs are required to be placed on both sides of the pipe crossing at the Right-of-Way line on a North Dakota State Highway crossing unless indicated otherwise by Engineer or Owner. Cost of marker signs shall be incidental to the pipe.

4. County Road Crossings

a. Installed with polyethylene water pipe by trenchless installation methods as specified and shall comply with the regulations of the corresponding county. The length of highway bores is shown on plans or will be determined by the Engineer's Field Representative as outlined in Section 01 22 00. Contractor may install additional polyethylene water pipe by this method for his convenience in crossing utilities or surface items that would require restoration; however, this pipe shall be paid for at the unit bid price for watermain pipe installation by open cut methods.

b. Marker signs are required to be placed on both sides of the pipe crossing at the Right-of-Way line on a County Road crossing unless indicated otherwise by Engineer or Owner.

5. Township and Private Road Crossings

a. Installed with polyethylene water pipe by trenchless installation methods as specified and shall comply with the regulations of the corresponding township. The length of the bores is shown on plans or will be determined by the Engineer's Field Representative as outlined in Section 01 22 00. Contractor may install additional polyethylene water pipe by this method for his convenience in crossing utilities or surface items that would require restoration; however, this pipe shall be paid for at the unit bid price for watermain pipe installation by open cut methods.

6. Railroad Crossings

a. All railroad crossings must be steel encased.

1) See Section 33 10 00 for casing requirements.

2) Install as indicated on Drawings or as directed by Engineer.

b. Installed by trenchless installation methods as specified and shall comply with the regulations of the corresponding railroad company. The length of railroad bores is indicated on plans and will be paid for on the basis of lump sum.

C. Additional Crossings

1. Contractor may install additional polyethylene water pipe by this method for his convenience in crossing utilities or surface items that would require restoration; however, this pipe shall be paid for at the unit bid price for watermain pipe installation by open cut methods.

D. Utility Crossings

1. Utility Crossings may be installed via trenchless installation methods if requested by Engineer. See Section 33 10 00 for requirements when crossing utilities. The length of the bores is shown on plans or will be determined by the Engineer's Field Representative as outlined in Section 01 22 00.

3.05 FIELD QUALITY CONTROL

A. General:

1. All Work under the contract shall be done to the lines and grades indicated in the Contract Documents or prescribed by the Engineer within acceptable tolerances. The Contractor shall provide the Engineer with reasonable advanced notice of the times and locations of proposed Work so that lines and grades may be furnished with minimum inconvenience to the Engineer and minimum delay to the Contractor. At the request of the Engineer, the Contractor shall, without charge, provide labor, material, tools, and equipment to temporarily assist the Engineer in determining measurements, surveys, and reference marks.
2. Grade Control shall be performed by the Contractor in accordance with the Contractor's submittal with Engineer approval.
3. It may be necessary at times that portions of the Contractor’s Work be discontinued for brief periods, to allow the Engineer to may make measurements or complete surveys without interruptions or other interference that might impair the accuracy of the results. At any time, on request of the Engineer, the Contractor shall discontinue his Work to accommodate Engineer’s on-site measurement and/or surveying services.
4. No direct payment will be made to the Contractor for Work or delays associated with the establishment or checks of lines, grades, or measurements. No extension of contract time will be allowed for such delays.

B. Field Tests and Inspections

1. The Contractor shall perform field tests, and provide labor, equipment and incidentals required for testing and inspections. The Contractor will provide evidence that any item of work is being or has been constructed in accordance with the Drawings and Specifications.

2. For directional bores, the Contractor shall use a horizontal directional drilling (HDD) tracking system to continuously monitor the line and grade during installation of the carrier pipe to determine any deviations and to provide information required for Record Drawing purposes. The Contractor shall verify the transmitter's readings prior to the start of the bore.

3.06 SETTLEMENT, ALIGNMENT, AND TOLERANCES

A. Bores

1. Settlement or heave of ground surface along centerline of boring alignments during and after installation of pipe shall not exceed one (1) inch.
2. Annulus between bore hole outside diameter and casing or carrier pipe outside diameter, as applicable, shall be 2-inches or less. The annular space created by overcut or reaming shall be filled with bentonite slurry.
3. High points, which allow air to collect in pipelines, will not be permitted unless an air release valve is indicated on the Drawings at that location.
4. Pipelines shall be installed to the vertical alignment shown on the Drawings with a tolerance not to exceed +/- 0.20'. The Contractor shall correct any deviation in the vertical alignment at no additional cost to the Owner. Corrective measures may include boring a new pipe length in a new location and abandonment and filling of bore hole placed in error. The Contractor must obtain approval from the Owner and Engineer prior to implementation of any corrective measures.
5. Pipelines shall be installed to the horizontal alignment shown on the Drawings or staked in the field with a tolerance of +/- 2.00'. The Contractor shall correct any deviation in the horizontal alignment that results in the bore(s) colliding with utilities that parallel the proposed pipeline route at no additional cost to the Owner. Corrective measures may include boring a new pipe length in a new location and abandonment and filling of bore hole placed in error. The Contractor must obtain approval from the Owner and Engineer prior to implementation of any corrective measures.
6. Pipe alignment shall be straight from one end of the bore to the other with no significant "dog legs" that will adversely affect the performance of the pipe or stress carrier pipe during installation.
7. All costs, losses, and damages associated with defective bore(s) will be paid by the Contractor including, but not limited to, additional engineering time, compensation for removal of defective bore(s) in the future, filling the defective bore(s) with controlled density fill (CDF), damage to structures or property, additional easement and right-of-way costs, and additional pipe and fittings required to correct alignment deviations to connect to PVC or POLY distribution or transmission pipelines.

3.07 BORING METHOD SCHEDULE

A. Cased Boring: Railroad and North Dakota Department of Transportation (NDDOT) roadway crossing as indicated on the Drawings, or as directed by Engineer.

B. Directional Boring: As shown on the Drawings for gravel and paved roads, water bodies, utilities, or other areas.

END OF SECTION

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SECTION 33 10 00
WATER UTILITIES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Polyethylene (HDPE) and Polyvinyl chloride (PVC) pipe and fittings for water lines.
2. Ductile Iron Pipe and Fittings
3. Gate valves, service saddles, couplers, flush valves, curb stops, ball valves, and appurtenances.
4. Connections to existing pipes.
5. Connections to new pipes.
6. Modular precast concrete manhole sections
7. Underground wastewater piping systems, including manholes, fittings and miscellaneous accessories.
8. On-site gravity PVC drain piping and fittings.
9. Bedding materials.
10. Accessories.

B. Related Sections include, but are not limited to:

1. Section 01 22 00 – Unit Price Measurement and Payment.
2. Section 01 25 00 – Substitution Procedures.
3. Section 01 31 13 – Project Coordination.
4. Section 01 31 19 – Project Meetings.
5. Section 01 33 00 – Submittal Procedures.
6. Section 01 45 00 – Quality Control.
7. Section 01 61 00 – Common Product Requirements.
8. Section 01 77 00 – Closeout Procedures.
9. Section 31 05 13 – Soils for Earthwork.
10. Section 31 05 16 – Aggregates for Earthwork.
11. Section 31 23 16 – Excavation.
12. Section 31 23 23 – Fill and Backfill.
13. Section 31 25 00 – Erosion and Sedimentation Control.
14. Section 32 39 14 – Singage and Bollards.
15. Section 32 90 00 – Landscape Grading.
16. Section 32 97 00 – Restoration of Disturbed Areas.
17. Section 33 13 00 – Disinfection of Water Systems.

1.02 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

1. ASTM A536 – Ductile Iron Castings.
2. ASTM D1248 – Polyethylene Plastics Extrusion Materials for Wire and Cable.
3. ASTM B584 – Standard Specification for Copper Alloy Sand Castings for General Applications
4. ASTM D1599 – Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings.
5. ASTM D1784 – Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated PVC Compounds.
6. ASTM D1785 – Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
7. ASTM D2000 – Rubber Products in Automotive Applications.
8. ASTM D2239 – Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameters.
9. ASTM D2241 – Polyvinyl Chloride (PVC) Pressure-Rated Plastic Pipe (SDR Series).
10. ASTM D2513 – Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings.
11. ASTM D2855 – Two-Step Method of Joining Poly Vinyl Chloride (PVC) or Chlorinated Poly Vinyl Chloride (CPVC) Pipe and Piping Components with Tapered Sockets.
12. ASTM D3035 – Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
13. ASTM D3139 – Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.
14. ASTM D3350 – Polyethylene (PE) Plastic Pipe and Fitting Materials.
15. ASTM F477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
16. ASTM F714 – Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.
17. ASTM F1055 – Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing.
18. AWWA C104/A21.4 – Cement-Mortar Lining for Ductile Iron Pipe and Fittings.
19. AWWA C105/A21.5 – Polyethylene Encasement for Ductile-Iron Pipe Systems.
20. AWWA C111/A21.11 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

21. AWWA C151/A21.51 – Ductile-Iron Pipe, Centrifugally Cast.
22. AWWA C153/A21.53 – Ductile-Iron Compact Fittings.
23. AWWA C502 – Dry Barrel Fire Hydrants.
24. AWWA C509 – Resilient Seated Gate Valves for Water Supply Service.
25. AWWA C605 – Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
26. AWWA C700 – Cold-Water Meters - Displacement Type, Metal Alloy Main Case.
27. AWWA C710 – Cold-Water Meters - Displacement Type, Plastic Main Case.
28. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 60 in.
29. AWWA C901 – Polyethylene (PE) Pressure Pipe and Tubing, 3/4 In. (19 mm) through 3 In. (76 mm), for Water Service.
30. AWWA C905 – Polyvinyl Chloride (PVC) Pressure Pipe, 14 in. through 48 in., for Water Transmission and Distribution.
31. AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 in. through 63 in, for Waterworks.

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

B. Before any materials or equipment are purchased, the Contractor shall submit a complete list of materials and equipment to the Engineer for approval. This information shall include the manufacturer's name and the type, size, rating and catalog number for each of the following items:

1. Ductile iron pipe and fittings.
2. Gate valves and boxes.
3. Corporation stops.
4. Flush hydrants.
5. Saddles.
6. Pipe and fittings.
7. Stop boxes.
8. Curb stops.

C. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories.

D. Product Test Reports: The manufacturer of the PVC or HDPE piping shall furnish an affidavit that all delivered materials comply with the requirements of ASTM D2241.

E. Installation Plan: Submit description of proposed construction plan, plan to establish and maintain vertical and horizontal alignment within specified tolerances, as applicable to open cut and boring method.

F. Submit for Engineer's approval prior to construction, information on Contractor proposed grade control equipment including, but not limited to, equipment operation, accuracy, and capabilities to record and verify final grade.

G. Pipeline Installation Plan: The Contractor shall submit a proposed Pipeline Installation Plan as a shop drawing a minimum of seven (7) days before any work begins for the Project. The Pipeline Installation Plan shall indicate all portions of the proposed pipeline that the Contractor intends to install by: either open-cut methods, directional drillings methods, by bore-and-push methods, or by other means. The location of proposed bore pits shall be shown on the proposed Pipeline Installation Plan.

1. Open-cut methods
2. Directional drillings methods
3. Bore-and-push methods
4. Other installation means

H. The location of proposed bore pits shall be shown on the proposed Pipeline Installation Plan.

1.04 SUBMITTALS AT PROJECT CLOSEOUT

A. Per Section 01 77 00.

B. Record actual locations of piping mains, valves, connections, and thrust restraints.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with Section 01 45 00.

B. Perform Work in accordance with grade tolerances as indicated in Sections 01 33 00, 01 45 00, 31 23 16, and 33 05 07.

C. Valves: Manufacturer's name and pressure rating marked on valve body.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01 61 00.

B. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.01 WATER PRESSURE PIPE AND FITTINGS

A. Polyethylene (HDPE) Water Pipe:

1. ASTM F714, AWWA C901, AWWA C906, PE4710 polyethylene compound with a cell classification of ASTM D3350-PE445574C.
2. Pressure Classes (unless indicated otherwise on Plan Sheets):
   a. Open Cut, Plow, or Trencher Installation:
      1) Size 2-inch through 12-inch: DR-11, Class 200, DIPS

   b. Directional Bores, and Cased Bore Carrier Pipe:
   c. Size 8-inch through 16-inch: DR-11, Class 200, DIPS
      a) Carrier Pipeline Exterior Fusion Welds shall be deburred.
      b) Casing Pipeline Interior Fusion Welds shall be deburred.
   d. Miscellaneous 1-inch Air Release/vacuum valve assembly lead pipe:
      1) Rated for a minimum working pressure of 250 psi, IPS, SDR-7, PE3330.

3. Provide with rigid, high-quality, stainless steel liners or stiffeners for insertion in the ends of HDPE pipe for all connections to appurtenances with the use of compression fittings.
4. Pipe shall be marked with identifications indicating the size, type, and class rating.
5. Pipe shall be manufactured in the United States.
6. Pipeline shall have a purple line indicating that this pipeline is supply reclamation water.
7. HDPE pipe joints and joints between plain end HDPE pipe and HDPE fittings shall be made by butt fusion or electrofusion-type polyethylene couplers (ASTM F1055). The Contractor shall ensure that persons making heat fusion joints have received training in the Manufacturer's recommended procedure.
8. Approved Manufacturers:
   a. CP Chem Polyethylene (Plexco).
   b. Sclair Pipe.
   c. ISCO.
   d. WL Plastics.
   e. Centennial Plastics, Inc.
   f. Approved Equivalent.

B. HDPE Water Main Fittings:

1. All fittings shall be supported by concrete blocks placed under the fitting and directly on top of virgin compacted earth.
2. Tees, Bends, and Reducers: Polyethylene, Molded Fittings, ASTM F714, PE4710, DIPS, polyethylene compound with a cell classification of ASTM

D3350-PE445574C. Pressure rating and SDR to match that of pipeline.Pressure rating and SDR to match that of pipeline. May only be placed directly on to adjacent HDPE pipe with butt fusion or electrofusion. Fabricated fittings may only be utilized with Engineer's approval.

a. Approved Manufacturers:
   1) CP Chem Polyethylene (Plexco).
   2) Sclair Pipe.
   3) ISCO.
   4) WL Plastics.
   5) Approved Equivalent.

3. Connection to HDPE Pipelines: Minimum 5-foot HDPE spool (comprised of stick HDPE pipe only) fused to each end or branch of HDPE fitting and butt fused at each HDPE connection point or jointed at each HDPE connection point with appropriate butt fusion or electrofusion coupler (ASTM F1055).
   a. Approved Manufacturers:
      1) CP Chem Polyethylene (Plexco).
      2) Sclair Pipe.
      3) ISCO.
      4) WL Plastics.
      5) Approved Equivalent.

C. End Connections for Non-Cased Bores, Directionally Drilled Bores, and Cased Bores:

1. Directionally drilled bores, and cased bores shall comply with the specifications set forth in Section 33 05 07.
2. Carrier pipe shall be HDPE as specified in Paragraph 2.01.A.
3. HDPE to HDPE end-of-bore connections shall be made using butt fusion or with appropriate electrofusion coupler (ASTM F1055) as specified in Paragraph 2.2.A.

D. End Connections for Capped Pipe:

1. Alpha Restrained Caps shall be used for the ends of each connection location:
   a. Hillside Memory Gardens Cemetary
   b. Drain Pond 5 (DP5)

E. Polyvinyl Chloride (PVC) Pipe:

1. PVC pipe of 12 inches in diameter and smaller
    a. PVC Pressure Pipe manufactured of PVC resin conforming to ASTM D1784, Type 1, Grade 1 (Class 12454-B). ASTM D2241 with Standard Thermoplastic Dimension Ratio (SDR). All pipe must bear the NSF 61 seal of approval for potable water.
    b. 6-inch through 12-inch: SDR-18, C900
    c. Pressure classes pertain to open cut, plow, or trencher installation.
    d. Pipe shall be supplied of consistent length with a minimum length of 20 feet.
    e. The manufacturer's recommended minimum pipe bending radius shall be at least 600 times the outside diameter of the pipe.
    f. The manufacturer of each shipment of pipe is required to supply a statement certifying that each lot or load of pipe has been subjected to the appropriate testing for PVC pipe meeting the requirements of ASTM D2241 or ASTM D1599, as applicable.
    g. Joints: ASTM D3139, push-on bell and spigot utilizing gasket sealing system meeting ASTM F477. Gasket sealing system shall be Locked-In Rieber Gasket type joint. Restrain pipe as required.
    h. Install pipe in compliance with manufacturer's recommendations and in accordance with ASTM D2241.
    i. Approved Manufacturers:
        1) Northern Pipe Products
        2) J-M Manufacturing Company, Inc.
        3) Diamond Plastics Corporation
        4) CertainTeed Pipe
        5) Approved Equivalent

F. Fittings for Polyvinyl Chloride (PVC) Fittings

1. Fittings for PVC pipe shall be ductile iron. See Paragraph G below.

G. Ductile Iron Pipe (DIP) and Fittings

1. The pipe and fittings furnished shall be of the Ductile Iron type as specified for each particular use or installation and shall be minimum Pressure Class 350 for pipe 4-12 inches and minimum Pressure Class 250 for pipe 14 inches and greater, unless otherwise noted.
2. Materials:
    a. Ductile iron pipe shall conform to the requirements of AWWA C151/ANSI A21.51 with mechanical joints.
    b. Mechanical or push-on joints shall conform to the requirements of AWWA C111/ANSI A21.11.
    c. The weight, class, or nominal thickness and casing period shall be shown on each pipe. The manufacturer's mark, year produced, and letters "DI" or "Ductile" shall be cast or stamped on the pipe.

d. Mechanical joint fittings shall conform to the requirements of AWWA C110/ANSI 21.10 or AWWA C153/ANSI 21.53 rated at 250 psi or 350 psi for piping larger than 16-inches in diameter, and AWWA C110/ANSI 21.10 or AWWA C153/ANSI 21.53 rated at 350 psi for sizes up to and including 16-inches in diameter. No plain end fittings shall be allowed.

e. Rubber gaskets shall conform to the requirements of AWWA C111. Gaskets used for air piping shall be EPDM.

f. All pipe joints and fittings shall have conductive gaskets with copper inserts or copper strap welded to the pipe and connected with “Cor-Blue” bolts by NSS industries, or equal. The conductors shall be rated at 600 amps sustained current.

g. The nuts and bolts shall be constructed of corrosion resistant, high-strength, low-alloy steel with a ceramic filled, baked on fluorocarbon resin. The nuts and bolts shall be in compliance with ANSI/AWWA C111/A21.11 and shall be “Cor-Blue” bolts by NSS industries, or equal.

h. All ductile iron pipe and fittings shall be lined with cement mortar in accordance with AWWA C104/ANSI A21.4, unless otherwise noted. Ductile iron pipe and fittings used for air piping shall not be cement lined.

i. All watermain materials furnished and installed under this contract shall be furnished by a manufacturer having notable reputation within the industry.

j. All ductile iron pipe and fittings shall be encased with enhanced V-BIO polyethylene encasement in accordance with AWWA C105.

3. All exterior surfaces of pipe and fittings shall have a tar or bituminous seal coating at least one (1) mil thick conforming to AWWA C151. Spotty or thin seal coating, or poor coating adhesion, shall be cause for rejection of the materials.

4. Retainer glands for restrained joints shall be American, US Pipe, or EBAA Iron, Inc. Mega Lug type, ductile iron, and be designed to meet or exceed the pressure classification of the corresponding pipe. Restraint glands for mechanical joint pipe shall be EBAA Iron, Inc. Megalug, Series 1100, or equal. Push joint pipe shall be restrained using restraint harnesses EBAA Iron, Inc. Megalug, Series 1700, or equal. Joint restraint systems shall be rated for at a minimum the design pressure of the pipe with a 2 to 1 safety factor.

5. Restrained joint pipe may be used in lieu of joint restraint systems for push on and mechanical joint pipe. Restrained joint pipe shall be US Pipe TR Flex or American Flex Ring pipe, or equal.

6. Nuts, bolts, and tie rod restraints shall be 304 stainless steel. Tee bolts for mechanical joints and fittings shall be “Cor-Blue” by NSS industries, or equal.

2.02 COUPLINGS

A. Couplings

1. HDPE to HDPE:
    a. Method 1: Butt fusion of HDPE pipeline to HDPEY pipeline.
    b. Method 2: Electrofusion coupling; 200 psi pressure rating; AWWA approved.
    c. Method 3: Restrained Couplings
        1) May be installed with prior approval from Engineer.

        2) Material: Shall be manufactured of a Ductile iron casting, meeting the requirements of ASTM A 536, grade 65-45-12 on all applicable parts, minimum-working pressure rating of 350 psi.

        3) Grippers shall be machine sharpened and heat treated. Coated for superior corrosion resistance.

        4) Draw hooks shall be of uncoated 304 stainless steel.

        5) Coated with a fusion bonded epoxy.

        6) Provide encasement in polyethylene conforming to ANSI/AWWA C105/A21.5.

        7) Gaskets meeting ASTM D2000 and NSF61.

        8) Ramp runners manufactured with black Nylon 66 and 14% glass filled.

        9) Bolts and Nuts manufactured R-Blue with 5/8-11 bolts with heavy hex nuts coated to reduce friction and provide corrosion resistance. Washer manufactured of 304 stainless steel.

        10) Type and Manufacturer:

            a) Alpha Restrained Coupling by Romac Industries, Inc.
            b) Approved Equivalent.
2. HDPE to PVC
    a. Method 1: Transition/Repair Coupler/Coupling to be made with extra-long PVC coupler/coupling.
        1) Transition couplings to be made with extra-long PVC coupler/coupling.

        2) Minimum length of four (4) feet on bores 400 feet or less.

        3) Minimum length of eight (8) feet on all bores greater than 400 feet.

        4) Rated for a minimum working pressure of 250 psi unless shown otherwise on the Drawings.

5) Approved Manufacturers:

a) CertainTeed.
b) Harco.
c) Napco Industries.
d) Specified Fittings, LLC.
e) Approved Equivalent.

b. Method 2: Restrained Coupler/Coupling

1) May be installed with prior approval from Engineer.

2) Material: Shall be manufactured of ductile iron casting, meeting the requirements of ASTM A 536, grade 65-45-12 on all applicable parts, minimum-working pressure rating of 350 psi.

3) Grippers shall be machine sharpened and heat treated. Coated for superior corrosion resistance.

4) Draw hooks shall be of uncoated 304 stainless steel.

5) Coated with a fusion bonded epoxy.

6) Provide encasement in polyethylene conforming to ANSI/AWWA C105/A21.5.

7) Gaskets meeting ASTM D2000 and NSF61.

8) Ramp runners manufactured with black Nylon 66 and 14% glass filled.

9) Bolts and Nuts manufactured R-Blue with 5/8-11 bolts with heavy hex nuts coated to reduce friction and provide corrosion resistance. Washer manufactured of 304 stainless steel.

10) Type and Manufacturer:

11) Alpha Restrained Coupling by Romac Industries, Inc.

a) Approved Equivalent.

3. HDPE to Ductile Iron

a. Restrained Coupler/Coupling

1) May be installed with prior approval from Engineer.

2) Material: Shall be manufactured of ductile iron casting, meeting the requirements of ASTM A 536, grade 65-45-12 on all applicable parts, minimum-working pressure rating of 350 psi.

3) Grippers shall be machine sharpened and heat treated. Coated for superior corrosion resistance.

4) Draw hooks shall be of uncoated 304 stainless steel.

5) Coated with a fusion bonded epoxy.

6) Provide encasement in polyethylene conforming to ANSI/AWWA C105/A21.5.

7) Gaskets meeting ASTM D2000 and NSF61.

8) Ramp runners manufactured with black Nylon 66 and 14% glass filled.

9) Bolts and Nuts manufactured R-Blue with 5/8-11 bolts with heavy hex nuts coated to reduce friction and provide corrosion resistance. Washer manufactured of 304 stainless steel.

10) Type and Manufacturer:

a) Alpha Restrained Coupling by Romac Industries, Inc.
b) Approved Equivalent.

2.03 GATE VALVES - RESTRAINED

A. Sizes 6-inch and Larger:

1. End Connections: Alpha design by American Flow Control and shall only require the use of one Type 304 Stainless Steel Fastener with all accessories being factory installed.
2. Working Pressure: 250 psi, AWWA C515.
3. Operating Nut: 2-inch square.
4. Materials:
   a. Body, Bonnet, and Single Wedge: Ductile iron (ASTM A53/A53M).
   b. Resilient seat.
   c. Stem: Stainless steel, non-rising.
   d. Exterior and Interior Coating: Fusion bonded epoxy; AWWA C550.
   e. Hardware: Interior and Exterior type 316 stainless steel bolts, nuts, and washers; Bronze trim.

B. Provide with Schedule 40 PVC valve box, valve box adapter, and cover marked "WATER" for each valve installed for the Project.

C. Encase buried metallic valves with High Density Cross-Laminated (HDCL) polyethylene encasement conforming to AWWA C105/A21.5 as specified in this section.

D. Install permanent gate valve nut 5-foot extension stems on all Project gate valve unless indicated otherwise by Engineer or Owner.

E. Provide two (2) short operating wrenches for use with gate valve nut extensions

F. Approved Manufacturers:

1. American Flow Control Series 2500-1 Resilient Wedge Gate Valves with Alpha Ends.
2. Approved Equivalent.

2.04 CONNECTIONS TO EXISTING PIPE

A. Connections to Existing HDPE Pipe:

1. Saddle for pipeline sizes from 1-inch through 16-inch:
   a. Electrofusion branch saddle
      1) All saddles shall have a minimum pressure rating of 200 psi. If the adjacent pipeline has a pressure rating greater than 200 psi, then the saddle shall have the same pressure rating as the adjacent pipes.

      2) Shall be rated for use on poly pipe and approved for wet tapping pipeline.

      3) Manufacturers:

         a) ISCO Industries.
         b) Approved Equivalent.

      4) Saddles may not be used in lieu of tees unless specified in the drawings or directed by the engineer.

      5) Pressure rating and SDR to match that of connecting pipeline with a minimum allowable pressure rating and SDR of SDR 11 & Class 200 psi.

      6) Saddle outlet shall be of poly fusion or female AWWA/CC threading.

      7) May only be used where indicated on the Drawings.

   b. Stainless Steel Saddles
      1) Must be a full wrap saddle.Saddles may not be used in lieu of tees on all new pipelines unless specified in the drawings.Pressure rating and SDR to match that of connecting pipeline with a minimum allowable pressure rating and SDR of SDR 11 & Class 200 psi.

2) All Stainless Steel Band Clamps, rated to be saddled and connected on to existing HDPE pipe with spring washers, Heavy gauge 18-8 Type 304 stainless steel construction, double bolt type with minimum band width of 4", and rubber gasket meeting ASTM D2000.

3) Saddle outlet shall be of female AWWA/CC threading.

4) May only be used where indicated on the Drawings or as directed by Engineer.

5) Manufacturers:

a) Ford Meter Box Company.
b) Cascade Waterworks Mfg. Company.
c) Mueller Valve Company.
d) Powerseal Pipeline Products Corporation.
e) A.Y. McDonald Mfg. Company.
f) Romac Industries, Inc.
g) Approved Equivalent.

2. Tapping Tee
   a. All tapping tees shall have a pressure rating and SDR to match that of connecting pipeline with a minimum allowable pressure rating and SDR of SDR 11 & Class 200 psi.
   b. Manufacturers:
      1) ISCO Industries.

      2) Approved Equivalent.

   c. Must be a full wrap tapping tee.
   d. Tapping Tees may only be used where indicated on the Drawings or as directed by Engineer.
   e. Tapping Tee outlet shall be of poly fusion or female AWWA/CC threading.
3. Tee: Install per Paragraph 2.01.B

B. Connections to Existing Ductile Iron Pipe:

1. Saddle for existing 24-inch effluent pipeline:
   a. All tapping tees shall have a pressure rating and SDR to match that of connecting pipeline with a minimum allowable pressure rating and SDR of SDR 11 & Class 200 psi.
   b. Stainless Steel Tap Sleeve w/mechanical joint outlet.
   c. Must be a full wrap tapping tee.
   d. Tapping Tees may only be used where indicated on the Drawings or as directed by Engineer.
   e. Manufacturers:
      1) Powerseal 3480MJ.

      2) Approved Equivalent.

2.05 CONNECTIONS TO NEW PIPE

A. Connections to New HDPE Pipe:

1. 1-inch through 16-inch:
    a. Use HDPE fittings with minimum 5-foot stick poly spools and butted end fusion or electrofusion couplers per Paragraph 2.2.A.
    b. Use of saddles is not permitted in lieu of tees for new pipe without prior engineer approval.

2.06 PIPE CASING REQUIREMENTS

A. Polyethylene Casing Pipe

1. Highway Crossings
    a. Polyethylene Casing Pipe is required when crossing North Dakota State Highways; based on the requirements stated on the crossing's issued permit by the North Dakota Department of Transportation. Install as indicated on Drawings or as directed by Engineer.
    b. Casing pipe shall meet the requirements to support the highway and live loads imposed on the highway and be at least two nominal sizes larger than the carrier pipe. Casing pipe shall be a minimum of DR11.
    c. Carrier Pipeline Exterior Fusion Welds shall be deburred.
    d. Casing Pipeline Interior Fusion Welds shall be deburred.
    e. Casing pipe shall be manufactured to meet the requirements as indicated on the Drawings.

B. Steel Casing Pipe

1. All railroad crossing must be steel encased.
2. Must be rated as having a minimum yield strength of 35,000 psi.
3. A wall thickness of 0.219-inches for casing pipe of 16-inches.
4. Casing pipe shall meet E-80 loading requirements.
5. Casing pipe shall be provided with cathodic protection or adequate BNSF-approved coating.
6. Be designed for effective corrosion control.

C. Casing Spacers

1. Casing spacers shall be non-metallic spacers constructed of preformed sections of high-density polyethylene. Spacers should be ISO 9001:2000 certified for strength and quality.
2. Casing spacers should be projection type with the minimum number of projections around the circumference that total the number diameter.
3. Casing spacers shall be centered in a restrained position configuration within the casing pipe.

4. Spacer should also have a minimum height that clears the pipe bell or as otherwise indicated on the plans.
5. Casing Spacers are not required when the carrier pipeline and casing pipeline are both Poly.
6. Manufacturer
    a. Raci Casing Spacers.
    b. Approved Equivalent.
7. Spacing
    a. As Detailed on the Drawings.

D. Casing End Seals

1. Once the carrier pipe has been installed inside of the casing pipe with all properly installed casing spacers, the annular space between the carrier pipe and the casing pipe shall be sealed by the installation of Modular Mechanical Seal at each end of the casing pipe and a rubber boot seal with stainless steel clamps.
2. Modular Mechanical Seal
    a. Seal shall be modular, mechanical type, consisting of inter-locking synthetic rubber links shaped to continuously fill the annular space between the carrier pipe and casing pipe.
    b. The elastomeric element shall be sized and selected per manufacturer's recommendations and have the following properties as designated by ASTM.
        1) -40 to +250°F (-40 to +120°C)
        2) EPDM: ATSM D2000 M3 BA510
    c. Color: Black
    d. Manufacturer
        1) PSI Pipeline Seal & Insulator, Inc.
        2) Cascade.
        3) Maloney.
        4) Approved Equivalent.
3. Boot Seals
    a. Approved Manufacturers:
        1) PSI Pipeline Seal & Insulator, Inc.
        2) Cascade.
        3) Maloney.
        4) Approved Equivalent.

2.07 FIRE HYDRANTS

A. All hydrants shall conform to the City of Williston's standard detail shown on 1/C503.

B. Hydrants shall be non-jacket types meeting the latest revision of AWWA C-502.

C. Hydrants shall be be dry-barrel construction closing with and opening against the inlet pressure.

D. Rated for minimum working pressure of 250 psig.

E. All hydrants shall be equipped with a break-off traffic flange and shall be capable of being extended in 6” increments.

F. Main Valve opening: 5-1/4" minimum.

G. Hydrant Barrel: 7 1/4" minimum inside diameter.

H. Type of shut-off: Compression.

I. Inlet connection: 6" size - mechanical joint type.

J. Nozzles: 2-2 1/2" hose nozzles; 1-4" pumper nozzle.

K. Nozzle threads: National Standard threads.

L. Bury depth: 8 feet 6 inches.

M. Stand Pipe: Ductile Iron.

N. Base: Shall be mechanical joint as shown on the Drawings and shall have an outlet to adequately restrain 6-inch pipeline. Use of Alpha Base by Romac Industries would be acceptable.

O. Bolts: All bolts below ground shall be type 304 stainless steel.

P. Equipped with a main valve, which opens against water system pressure. Main valve shall be bronze seated and valve seat shall have a minimum 5-inch diameter opening and thread into a non-clog bronze drain ring.

Q. Removeable internal hydrant parts through the hydrant barrel without need for excavation.

R. Counterclockwise opening rotation; hydrant operating nut for main hydrant valve.

S. Provide hydrant operating wrench for each hydrant.

T. Finish: Epoxy primer and two coats of two-part polyurethane topcoat. Base to be coated with fusion-bonded epoxy. Repair finish damaged in shipping or handling.

1. The topcoat color of any fire hydrant **connected to the finished water distribution system** shall be the City of Williston standard color (Red).
2. The topcoat color of any fire hydrant **connected to the reuse water pipeline** shall be painted Barney Purple (non-potable water use).

U. All hydrant connected to a non-potable water main shall have "Out of Service" tags installed on them.

V. Encase buried metallic components. with High Density Cross-Laminated (HDCL) polyethylene encasement conforming to AWWA C105/A21.5 as specified in this section.

W. Approved hydrants

1. Waterous Pacer WB67-250.
2. Approved equivalent.

2.08 CORPORATIONS STOPS

A. Corporation Valve

1. Brass Construction.
2. Pressure Rating: Meeting or exceeding pressure rating of adjacent pipe.
3. Threading shall be of AWWA/CC threading.
4. Inlet and outlet openings same size as the valve.
5. Connect to watermain by use of tapped saddle fittings.
6. Must be of quarter turn operation with off/on indication, and must NOT have the ability to rotate 360 degrees.
7. Manufacturers:
   a. A.Y. McDonald Mfg. Company.
   b. Ford Meter Box Company.
   c. Mueller Valve Company.
   d. Approved Equivalent.

2.09 AIR RELEASE/VACUUM VALVE ASSEMBLY

A. Manhole and Lid:

1. Shall be of an 18-inch diameter PVC shell with a minimum wall thickness of 0.366-inches.
2. Lid shall be 18-inch Flat Lid with a center mounted pentagon nut lock as shown on Drawings.
3. Lid shall meet AIS criteria.

B. Interior Rigid Piping and Vent Piping: ASTM D1785, Schedule 80 PVC pipe, shall be sized to fit valve.

1. Vent piping shall extend at least one foot above grade and provided with a screened, downward-facing elbow unless an inflow preventer is utilized.
2. Inflow preventer:
    a. Certified Lead-Free in accordance with NSF 61.
    b. Conforming to AWWA C514.
    c. Approved Manufacturer and Model:
        1) Floodsafe Inflow Preventer.
        2) Approved Equivalent.

C. Interior Flexible Piping: Polybutylene water service tubing conforming to requirements of ASTM D-2581. Rated for a minimum working pressure of 250 psi, with standard thermoplastic dimension ration (SDR) not to exceed 9. Any coupling of service lead piping shall be made with copper couplers.

D. Approved Valves:

1. Air Release Valve: 1-inch Combination air valve, Model 143C manufactured by Apco, or Model 201C manufactured by Val-Matic, or Approved Equal with inflow preventor or vent piping as specified.
2. Ball Valves as specified in in Section 40 05 58.

E. Insulation:

1. Install three (3) 4-inch rigid insulation barriers to the interior of the SDR 35 PVC pipe as shown on the Drawings.
2. The insulation shall be applied to the exterior side of the SDR 35 PVC pipe as indicated on the Drawing details.
3. The SDR 35 PVC pipe shall be covered with insulation to prevent freezing of the air release valves.
4. Product shall be rated for buried installation.
5. Rigid Interior Insulation:
    a. Thickness: 2 inches minimum.
    b. R-Value: 5 per inch of insulation.
6. External Insulation:
    a. Spray on or rigid polyurethane foam insulation.

2.10 STORM MANHOLE

A. Manhole Sections, bases, and top sections

1. All structures shall be designed and stamped by a Registered Engineer in the state of North Dakota.
2. Reinforced precast concrete as outlined in ASTM C478 able to withstand H25 loading and backfill requirements; including knockouts for wall pipes as shown on Drawings. Concrete shall be Type 5 Portland cement per ASTM C150 with minimum 28-day compressive strength of 4,000 psi.

3. Reinforcement: Reinforce with deformed billet-steel conforming to ASTM A615 or deformed welded wire fabric conforming to ASTM A496 and ASTM A497 for the anticipated loading conditions.
4. Welded Wire Fabric: Conforming to ASTM A185.
5. Prestressing Strand: Uncoated, 7-wire, stress relieved strand conforming to ASTM A416 (including supplement) - Grade 270K, low relaxation type.
6. Connecting and Supporting Devices: Plates, angles, items cast into concrete, insets, bolts and accessories, conforming to ASTM A36. All items cast into precast concrete to be prime painted.
7. Welded Studs: Conform to AWS D1.1.
8. Admixtures:
    a. Air entraining admixtures: ASTM C260.
    b. Water reducing, retarding, accelerating, high range water reducing admixtures: ASTM C494.

B. Precast Concrete Vaults for Pressure Sustaining Valve Manhole and Pressure Reducing Valve Manhole

1. Manholes Sections: Reinforced precast concrete as outlined in ASTM C478 able to withstand water loading requirements; including knockouts for wall pipes as shown on Drawings.
2. Circular Sections: Reinforced precast concrete outlined in ASTM C76 Class IV, double cage steel reinforcement, including knockouts for wall pipes and tie bolts.
3. Box Sections: Reinforced precast concrete as outlined in ASTM C858, C890, and C913, double cage steel reinforcement, including knockouts for wall pipes and tie bolts.
4. Manholes shall be sized as shown on the Construction Drawings or if size is not noted, as appropriately for piping size, type, and locations in accordance with manufacturer’s recommendations.

C. Joints

1. Precast concrete unit riser section joints shall be tongue and groove with rubber “O” ring joint gaskets. Profile joint gaskets may be used if reviewed and approved by Engineer.
2. Precast concrete unit joints shall be formed entirely of concrete employing a circular cross section gasket, Press Seal, or equal. When assembled, the joint shall be self-centering and make a uniform watertight joint conforming to the requirements of ASTM C443.
3. Joints shall also be sealed with a bituminous mastic joint sealing compound, Kent Seal No. 2, by Hamilton Kent Manufacturing Co., or approved equivalent.

4. Provide external joint seal on all manhole section joints. External joint seal shall be a 12 inch wide heavy bitumastic coating, Infi-Shield Seal Wrap, by Sealing Systems Inc., or equal.

D. Bottom Slab Sections

1. Bottom slab sections shall be precast concrete conforming to ASTM C478. Bottom slabs shall be suitable for depth and groundwater conditions encountered.
2. Inverts shall be formed as an integral part of the precast bottom and constructed as shown on the Drawings and shall have a smooth commercial finish.
3. Preformed bases shall have spaces filled with the appropriate sealer.
4. Where there are changes in the direction of the flow or entering branches into the unit, the centerline of the invert shall have a true curve of as large a radius as the size of the manhole will permit. A minimum fall of 0.10 foot shall be provided through all manholes.
5. The inside bottom of each unit shall be shaped with concrete to form a free flow channel through invert troughs.

E. Top Slab Sections

1. Top slab sections shall be precast concrete conforming to ASTM C478. Top slabs shall be suitable for H25 wheel loading.
2. Commercial finish formed surfaces and broom finish top surface.
3. Provide tapered handling hooks as required.
4. Provide access hatch as specified in Paragraph F.

F. Access Hatches

1. Valve Vault Access Fram and Cover:
   a. 30" x 30" clear opening.
   b. 1/4" thick 6061-T6 aluminum alloy, ASTM GSI1A, diamond pattern plate access cover.
   c. Doors shall open to 90° and automatically lock with stainless steel hold-open arms with aluminum release handles. The arms shall incorporate enclosed stainless steel compression spring assists.
   d. Unit shall lock with a stainless steel slam lock with removable key and non-corrosive handle.
   e. 1/4" thick one-piece, mill finish, extruded aluminum frame, incorporating a continuous concrete anchor.
   f. Doors shall close flush with the frame and rest on a built-in neoprene cushion/gasket.
   g. Hinges and fastening hardware shall be stainless steel.
   h. Unit shall be guaranteed against defects in material and workmanship for 10 years.
   i. Size and quantity as indicated on the Drawings.

j. Acceptable Manufacturers:
   1) Halliday Products.
   2) Bilco.
   3) Or equal.

G. Manhole Steps

1. Where called for on the Drawings, provide plastic steps placed at 12" spacing. Steps shall comply with ASTM C-478 and OSHA.
2. Whenever possible, steps shall not be placed directly above the manhole flow channel. Steps should be located above the largest bench area in the manhole base. Steps shall be equally spaced, 12-inches on center maximum, for the entire depth of the manhole.

H. Grade Adjustment Rings

1. Grade adjustments of manhole frame and cover assemblies shall be completed utilizing HDPE adjusting rings, standard two-inches thick. Each new manhole shall have a total height of adjustment between four (4) and six (6) inches, unless otherwise directed by ENGINEER.
2. Precast reinforced concrete grade adjustment rings shall conform to ASTM C378 and shall be free from cracks, voids, and other defects.
3. The diameter or rectangular dimension of rings shall conform to the type of casting on the structure.
4. Provide grout or mortar between the rings.
5. Wrap adjusting rings, edge of casting frame, and upper barrel section (where applicable) with Infishield, or CretexTM External Manhole Chimney Seal, approved flexible sealing product per manufacturers specs.

I. Mortar

1. Mortar shall conform to ASTM C270. The cement shall be Type S masonry cement.
2. Water shall be added for proper consistency. The entrained air content of the mortar shall range between seven (7) to ten (10) percent.
3. Mortar sand volume shall equal 2.25 to 3.00 times the total volume of cement and lime.

J. Pipe Connections to Manholes

1. Grouted Connections (knock-outs)
   a. Non-shrink masonry cement.
   b. For larger knock-out openings, Contractor shall use bricks on the interior to provide a stable, hard surface for the non-shrink masonry cement.

2. Boot Connections
   a. Pipe to manhole connections on all pipes shall be flexible and watertight. Pipe shall be sealed in the manhole section pipe openings with a resilient connector meeting the requirements of ASTM C923. The connection may be of the following types:
      1) Rubber sleeve with stainless steel banding type, Press Seal PSX, A-Lok G3, or equal. Install by mechanical means in openings cut into manhole wall per ASTM C923.

      2) Cast in place rubber gasket with stainless steel banding type, Press Seal Cast A Seal, or equal. Resilient connector shall be cast integrally into the wall of the manhole section at time of manufacture.

      3) Core drilled connections shall utilize link seal where indicated on the drawings.

3. Pipe to manhole connections shall utilize link seal where indicated on the drawings.

2.11 STORM MANHOLES (FOR DRAIN MANHOLES)

A. Barrel and cone sections:

1. Precast concrete sections per ASTM C-478, 48" or 60” inside diameter as referenced in the drawings.
2. Tongue and groove ends with pre-formed flexible joint sealer.
3. Eccentric type cone sections per standard details.

B. Steps:

1. Verify that manhole steps are required by the governing authority and Engineer prior to ordering manholes.
2. When steps are required, the following requirement pertains:
   a. Meet FS RR-F-6216 and ASTM C-581.
   b. 12" wide, 16" vertical spacing.
   c. Aluminum, Neenah R-1982-W, or fiberglass, Permastep Model 112-P, or rubber coated ductile iron or steel.
3. 12" wide, 16" vertical spacing.
4. Aluminum, Neenah R-1982-W, or fiberglass, Permastep Model 112-P, or rubber coated ductile iron or steel.
5. Meet FS RR-F-6216 and ASTM C-581.

C. Access Frames and Covers:

1. Standard Casting: ASTM A48, Class 35B Gray (cast) Iron construction machined flat bearing surface, removable lid.
2. Standard Manhole: Neenah Model R-1733 or approved equivalent.

3. Components
    a. Strap Anchors: Bent shape, 304 stainless steel, 2 inches wide x 1/4 inch thick x required length.
    b. Pipe Connectors: Cast-in resilient type (Ferncos) with stainless steel straps.

D. Lids and Base Slabs:

1. Lids (where required or specified) and bottom slab sections shall be precast concrete conforming to ASTM C478 and of thickness, diameter, and reinforcement as shown on the Construction Drawings and manhole schedule. Bottom slabs shall be suitable for depth and groundwater conditions encountered.
2. Inverts shall be formed as an integral part of the precast bottom and constructed as shown on the Drawings and shall have a smooth commercial finish.
3. Bases shall be monolithic with joints extending past pipe openings.
4. Where there are changes in the direction of the flow or entering branches into the unit, the centerline of the invert shall have a true curve of as large a radius as the size of the manhole will permit. A minimum fall of 0.10 foot shall be provided through all manholes.
5. The inside bottom of each unit shall be shaped with concrete to form a free flow channel through invert troughs.
6. Reinforcement: Reinforce with deformed billet-steel conforming to ASTM A615 or deformed welded wire fabric conforming to ASTM A496 and ASTM A497 for the anticipated loading conditions.

E. Joints:

1. Precast concrete unit riser section joints shall be tongue and groove with rubber “O” ring joint gaskets. Profile joint gaskets may be used if reviewed and approved by Engineer.
2. Precast concrete unit joints shall be formed entirely of concrete employing a circular cross section gasket, Press Seal, or equal. When assembled, the joint shall be self-centering and make a uniform watertight joint conforming to the requirements of ASTM C443.
3. Joints shall also be sealed with a bituminous mastic joint sealing compound, Kent Seal No. 2, by Hamilton Kent Manufacturing Co., or equal.
4. Provide external joint seal on all manhole section joints. External joint seal shall be a 12 inch wide heavy bitumastic coating, Infi-Shield Seal Wrap, by Sealing Systems Inc., or equal.

F. Resilient Pipe Seals:

1. Resilient connector cast integrally into the manhole wall.

2. Compression seal type, mechanical fasteners, if used, shall be stainless steel.
3. Conform to ASTM C-923.

G. Adjusting Rings: Reinforced concrete, 1" to 4" vertical adjusting increments:

1. Conform to ASTM C-923.
2. The outside diameter of the adjusting rings shall be equal to or greater than the diameter of the casting base.

2.12 BEDDING AND BACKFILL MATERIALS

A. Bedding: Fill Type S1 and Type S2, as specified in Section 31 05 13

B. Backfill: Fill Type S1 and Type S2, as specified in Section 31 05 13.

2.13 ACCESSORIES

A. Concrete for Thrust Restraints and Splash Pads: Premixed bagged concrete consisting of aggregate and Type I Portland Cement. Form and pour thrust restraints for pipe, fittings, and plugs as shown on the Drawings.

B. Bolts and Related Hardware: Stainless steel underground bolts, including all bolts on fittings, valves, hydrants, and transition couplers. Properly lubricate bolts to prevent seizing.

C. Storm Manholes

1. Manhole Access Frames and Covers:
   a. Standard Casting: ASTM A48, Class 35B Gray (cast) Iron construction machined flat bearing surface, removable lid.
   b. Manufacturer and Products
   c. Standard Manhole: Neenah Model R-1733 or approved equivalent.
2. Components
   a. Strap Anchors: Bent shape, 304 stainless steel, 2 inches wide x 1/4 inch thick x required length.
   b. Pipe Connectors: Cast-in resilient type (Ferncos) with stainless steel straps.

2.14 POLYETHYLENE ENCASEMENT

A. Conform to ANSI/ASTM D1248 and install per AWWA C105/A21.5.

B. High Density Cross-Laminated; 4 mil minimum thickness.

C. Install on all underground metallic items, including but not limited to: ductile iron pipe, ductile iron fittings, gate valves, other metal pipe and fittings, fire hydrants,

stainless steel couplings, transition couplings, and service and testing tapping saddles.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions under provisions of Section 01 31 19.

3.02 PREPARATION AND STORAGE

A. Store pipe on-site on flat surface so barrel is evenly supported. Do not stack higher than 6 feet. Cover pipe with opaque material for extended storage.

B. Remove scale and dirt on inside and outside before assembly. Inspect for damage to pipe and other materials before installation.

C. Store all valves and appurtenances according to manufacturer’s recommendations.

D. Storm Manholes - Coordinate placement of inlet and outlet pipe or duct sleeves required by other Sections.

3.03 INSTALLATION - PIPE AND APPURTENANCES

A. Install all pipe and appurtenances in strict accordance with manufacturer's recommendations.

B. Install potable water mains at a minimum cover depth of 90 inches (7.5 feet) below finished grade to top of pipe, unless noted elsewhere. In areas of graveled or compacted driveways and parking lots, pipe depths shall be increased to a minimum cover of 96 inches (8 feet). Construct to lines, grade, and dimensions as detailed on construction Drawings.

C. Install non-potable water mains as shown on Drawings or as approved by the Engineer/Owner.

D. Set buried fittings on concrete blocks and pads that rest on solid bearing soils.

E. Do not gouge or mar pipe in any fashion.

F. Take up and relay any pipe disturbed from its required grade or alignment.

G. Keep trenches free from water until pipe jointing is complete.

H. Securely close open ends of pipe and fittings when Work is not in progress.

I. Cut pipe in a neat and workmanlike manner by an approved mechanical cutting machine.

J. Install pipe to allow for expansion and contraction without stressing pipe or joints.

K. Connect new water supply to existing water supply where shown on Drawings. Notify Engineer at least 7 days in advance of the time connections are to be made and coordinate connection operations with the Owner in effort to minimize interference with existing water system service.

L. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main per Drawing details.

M. Grade water main to avoid high spots and air pockets.

N. Install water main and appurtenances to avoid existing utilities.

O. Install pipe such that maximum deflections from straight line or grade do not exceed manufactures specifications. Install bend fittings where maximum deflections are exceeded.

P. Install pipelines within the vertical alignment shown on the Drawings with a tolerance not to exceed +/- 0.20'. The Contractor shall correct any deviation in the vertical alignment at no additional cost to the Owner. Corrective measures shall involve boring or open cut placement of a new pipe length in a new location as directed by Engineer. The Contractor must obtain approval from the Owner and Engineer prior to implementation of any corrective measures.

Q. Pipelines shall be installed to the horizontal alignment shown on the Drawings or staked in the field with a tolerance of +/- 2.00'. The Contractor shall correct any deviation in the horizontal alignment that results in the bore(s) colliding with utilities that parallel the proposed pipeline route at no additional cost to the Owner. Corrective measures may include boring a new pipe length in a new location and abandonment and filling of bore hole placed in error. The Contractor must obtain approval from the Owner and Engineer prior to implementation of any corrective measures.

R. **Provide adequate adapters and couplers for connections of different pipe types and sizes.**

S. **Where and as directed by Engineer, pipelines shall be installed by the trenchless installation methods to avoid disturbance of surface features. Refer to Specification 33 05 07. All boring pits shall be sheathed and braced, as necessary, to provide a safe place for workmen. The Contractor shall comply with all applicable OSHA safety requirements relating to this type of construction. Separate Bid items are provided for water main installed by non-cased bore methods, and payment will be made only where specifically requested by Engineer. Contractor may install additional pipe by this method for his convenience in crossing utilities or surface**

items that would require restoration; however, this pipe shall be paid for at the unit bid price for watermain installed by open cut methods.

T. Excavate and backfill trench in accordance with Section 31 23 16 and Section 31 23 23, respectively.

3.04 INSTALLATION – VALVES, FLUSH CLEANOUTS, CURB STOPS, AND CORPORATION STOPS

A. Locate curb stops, gate valves, air release valves, pressure reducing valve, etc. as directed by Engineer.

B. Set buried valves on concrete blocks and pads that shall rest on solid bearing soils per Drawing details.

C. Center and plumb valve box over valve or curb stop. Set valve box cover flush with finished grade or as shown on Drawings.

D. Locate valves outside road or street areas.

E. Provide down-stream side of curb stop with polyethylene pipe to the surface. Provide suitable cap to prevent entrance of dirt and other foreign materials.

F. Set cleanouts to existing grade or as shown on Drawings.

G. Locate control valve a minimum of 2 feet away from discharge.

H. Provide a drainage pit for cleanouts, consisting of not less than 5 cubic feet washed gravel.

I. Provide suitable cap to prevent entrance of dirt and other foreign materials on ends of pipe until final connections are completed.

J. Install flush cleanout curb stops plumb, on a concrete pad, and to existing grade or as shown on Drawings.

K. Encase all ductile pipe valves, gate valves, transition couplings, and fittings in polyethylene encasement.

L. Install service lead curb stops plumb and per details contained in Drawings.

M. Excavate and backfill trenches in accordance with Sections 31 23 16 and 31 23 23, respectively.

3.05 PLACING MANHOLE SECTIONS

A. Place base pad, trowel top surface level.

B. Place manhole sections plumb and level, trim to correct elevations, anchor to base-pad, and seal section joints as noted on the Construction Drawings.

C. Provide openings for existing pipe connections and new pipe that conform to the required pipe connection types

D. Grouted pipe openings shall be sealed with non-shrink masonry cement.

E. Boot-sealed pipe openings shall be sealed as noted on the Construction Drawings and specifications.

F. Grout lifting holes neatly to the curvature of the barrel with non-shrink masonry cement. Trowel smooth. Contour as required.

G. Install preformed plastic sealing compound or water stop as required between joints of manhole sections to insure leak proof manhole.

H. Adjusting rings should be set in place and grouted with mortar or non-shrink masonry cement to provide a smooth appearance, and connections shall be watertight.

I. Set cover frames and covers level without tipping, to correct elevations.

J. Coordinate with other sections of work to provide correct size, shape, and location.

K. Construct concrete bench and channel.

L. Manhole and casting final rim surface elevations shall be one-half inch below pavement elevation when set in pavement, or at grade when set in turf.

M. Manhole Steps

1. Manholes shall be placed at a spacing as noted on the Construction Drawings. If no spacing is noted, steps on 12-inch centers shall be provided.
2. Steps in all sections shall be aligned in each section so as to form a continuous ladder with rungs.
3. Steps shall project a minimum of 4 inches from the manhole wall.
4. Whenever possible, steps shall not be placed directly above the manhole obstructions. Steps should be located above the clear area in the manhole base.

3.06 FLUSHING OF SYSTEM WATER LINES

A. Water will not be readily available during this project. Contractor shall flush system water lines after water become available from the Williston Water Resource Recovery Facility.

B. Flush water lines thoroughly before water system is placed into operation.

C. Pipelines three (3) inches and Larger: Fill water main to expel all air from main. “Pig” all newly installed pipelines using potable water source. Contractor shall prepare a proposed “pigging” plan and review with Engineer and Owner prior to implementation.

3.07 FIELD QUALITY CONTROL

A. Per Section 01 45 00 - Quality Control.

B. Hydrostatic Testing for HDPE Pipeline

1. Submit suggested plan/procedure to Owner and Engineer for Approval.
2. Subject newly laid pipe to a leakage and hydrostatic pressure test for a period of two hours at a minimum pressure of 200 psi.
3. Fill water main with water a minimum of 24 hours before the test. Ensure thermal equilibrium and allow any dissolved air to be expelled from the main prior to pressure testing.
4. Avoid development of waterhammer in pipeline.
5. Begin initial expansion phase by gradually pressurizing the watermain, adding any make up water as necessary to reach and maintain testing pressure for four (4) hours. The initial expansion phase does not require monitoring amount of water added.
6. Upon maintaining testing pressure for four (4) hours, immediately begin test phase by reducing test pressure by 10 psi, cease adding water, and monitor pressure for one (1) hour.
7. If during/after completion of test phase, the test pressure remains steady (within 5% of the target value) and no visual leakage is observed, no leakage is indicated and water main passes hydrostatic pressure testing.
8. Complete, execute, and submit to Engineer the Pressure Test Report for each pressure test after pressure test completion and Engineer examination.
9. Depressurize the main at a controlled rate to avoid water hammer.
10. If during/after completion of test phase, the test pressure does **not** remains steady (within 5% of the target value) and/or visual leakage is observed, no leakage is indicated water main fails the pressure test.
11. Locate and repair any defective areas if test fails.
12. Retest after completion of repairs.
13. Repeat procedure until tests pass.
14. Complete, execute, and submit to Engineer the Pressure Test Report for each pressure test after pressure test completion and Engineer examination.
15. Depressurize the main at a controlled rate to avoid water hammer.

3.08 RAILROAD, TOWNSHIP, COUNTY, STATE ROAD, AND WETLAND CROSSINGS

A. See Section 33 05 07 for requirements.

3.09 UTILITY CROSSING REQUIREMENTS

A. Install water mains no closer than a horizontal distance of 10 feet from the sewer, except when crown of the sewer is at least 18 inches below invert of the water main and the sewer pipe is laid in a separate trench or water main is laid to one side of common trench on a bench of undisturbed soil, separation shall be 6 feet horizontally.

B. Where new water main crosses an existing sewer:

1. Center full length of water main over sewer if crossing is within 3 feet above or below sewer.
2. No additional protection required if water main is at least 3 feet above sewer.

C. Where new water main crosses an existing utility, including but not limited to fiber, telephone, petroleum, and natural gas pipes:

1. A minimum vertical distance of 2' from bottom of utility to top of water main shall be maintained, unless otherwise approved.
2. All requirement with corresponding utility easements must be met.

D. Provide thoroughly compacted backfill between pipes where a new pipe crosses a new or existing pipe for adequate support.

E. Utility Crossings may be installed via trenchless installation methods if requested by Engineer, see Section 33 05 07. The length of the bores is shown on plans or will be determined by the Engineer's Field Representative as outlined in Section 01 22 00.

3.10 DATA FOR AS-BUILT RECORDS

A. Record location of all alignment changes, fittings, couplings, valves, and other underground appurtenances installed on sheets provided for such purposes by the Engineer.

END OF SECTION

SECTION 33 13 00
DISINFECTION OF WATER SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Disinfection of potable water system.
2. Testing and reporting results.
3. **This specification applies only to existing watermains or hydrant leads that may be disturbed, rerouted, raised, lowered, or otherwise modified as a result of the construction work. The reuse water pipeline does not need to be disinfected.**

B. Related Sections include, but are not limited to:

1. Section 01 33 00 – Submittal Procedures.
2. Section 01 45 00 – Quality Control.
3. Section 01 77 00 – Closeout Procedures.
4. Section 33 10 00 – Water Utilities.

1.02 REFERENCES

A. Reference Standards include, but are not limited to:

1. AWWA B300 – Standard for Hypochlorites.
2. AWWA B301 – Standard for Liquid Chlorine.
3. Federal Specifications BB-C-12a, O-C-114a, and O-C-602b.
4. AWWA C651 – Disinfection of Water Mains.

1.03 SUBMITTALS FOR INFORMATION

A. Submit under provisions of Section 01 33 00.

B. Test Reports: Indicate results comparative to specified requirements

1.04 DEFINITIONS

A. Disinfectant Residual means the concentration of disinfectant in the treated water.

B. PPM means parts per million.

1.05 QUALITY ASSURANCE

A. Regulatory Agency Requirements: Comply with North Dakota Department of Environmental Quality requirements.

B. Perform work in accordance with AWWA C651 for the disinfection of water mains.

C. Testing Firm: Company specializing in testing potable water systems, approved by the North Dakota Department of Environmental Quality. Contractor shall notify the City Public Works Department to come out and collect samples for the bacteriological test. Contractor shall coordinate sampling and testing schedule with the City and the laboratory. Contractor shall pay all testing fees and lab costs.

D. Submit bacteriologist's signature and authority associated with testing.

E. The cleaning and disinfection work shall be conducted prior to connection to the existing water lines or to any portion that has been put into service. Unless otherwise approved, hydrostatic testing shall be completed prior to final cleaning and disinfection.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect against damage and contamination.

B. Maintain caution labels on hazardous materials.

C. Maintain storage room dry and with temperatures as uniform as possible between 60 and 80 degrees F.

D. Provide necessary signs, barricades, and notices to prevent any person from accidentally consuming water or disturbing system being treated.

1.07 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01 33 00 – Submittal Procedures and Section 01 77 00 – Closeout Procedures.

B. Disinfection report:

1. Type and form of disinfectant used.
2. Date and time of disinfection.
3. Test locations.
4. Initial and final disinfectant residuals (quantity in treated water) in ppm for each test.
5. Date and time of flushing start and completion.
6. Disinfectant residual after flushing in ppm for each location test.

C. Bacteriological report:

1. Date issued, project name, and testing laboratory name, address, and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and final disinfectant residuals in ppm for each test location.
6. Coliform bacteria test results for each test.

PART 2 - PRODUCTS

2.01 ACCEPTABLE DISINFECTION CHEMICALS

A. AWWA B300, Hypochlorite: Shall conform to Federal Specification O-C-114a, Type II, Grade B, or Federal Specification O-C-602b.

B. AWWA B301, Liquid Chlorine: Shall conform to Federal Specification BB-C-120a.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify that piping system has been cleaned, inspected, and pressure tested.

B. Do not start Work until conditions are satisfactory.

C. Select one form of chlorine for use in disinfection.

D. Flush mains thoroughly before introduction of chlorinating material. Maintain flushing velocity in main of not less than 2.5 feet per second unless the Engineer determines that conditions do not permit the required flow to be discharged to waste.

3.02 DISINFECTION OF WATER SYSTEMS

A. Provide and attach required tools, equipment, and materials to perform the Work of this Section. Disinfectant material shall be introduced into the water system in a manner approved by the Engineer. For wells, add the required amount of chlorination material into the casing before installation of pumping equipment. Agitate as required for thorough mixing.

B. Use of calcium hypochlorite granules for use on solvent welded plastic or on screwed joint steel pipe is prohibited because of the danger of fire or explosion from the reaction of the joint compounds with the calcium hypochlorite.

C. Perform disinfecting in accordance with AWWA C651 and City of Williston Standard Specifications for Construction prior to start-up. Coordinate with other Contractors, Engineer, and Owner.

D. Inject treatment disinfectant into piping system to obtain 50 to 80 ppm residual.

E. Test for disinfectant residual at each of the following locations:

1. End of piping runs.

F. Maintain disinfectant in system for 24 hours. If disinfectant residual is less than 25 ppm, repeat system treatment.

G. All water supply and distribution mains shall be disinfected with chlorine prior to acceptance by the owner.

H. As chlorinated water flows past new fittings and valves, related valves shall be operated so as to disinfect appurtenances and pipe branches. All valves shall be opened and closed several times during the contact period.

I. Drain and flush using fresh water pumped through the system.

J. Flush heavily chlorinated water from main until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the system.

K. Notify Owner and Engineer when ready for sampling so personnel from the City Public Works Department could come out and collect the samples for the bacteriological test.

L. Any sections of equipment in contact with water shall be swabbed with a chlorine solution prior to installation.

M. Properly dispose of heavily chlorinated water supply in an environmentally acceptable manner.

N. Contractor shall pay all testing costs.

3.03 BACTERIOLOGICAL TESTING

A. After disinfection and flushing, water in pipelines for bacteriological contamination as outlined in the following Options:

1. Option A: Before approving a main for release, take an initial set of samples and then resample again a minimum of 16 hours using the sampling site procedures outlined. Both sets of samples must pass for the main to be approved for release.

2. Option B: Before approving a main for release, let the main sit for a minimum of 16 hours without any water use. Then collect, using the sampling site procedures outlined and without flushing the main, two sets of samples a minimum of 15 min apart while the sampling taps are left running. Both sets of samples must pass for the main to be approved for release.

B. Samples shall be taken from the hydrants. Duplicate samples shall be collected from each hydrant.

C. Two or more successive test samples indicating bacteriological satisfactory water shall be obtained before facility is placed into operation.

D. If contamination is shown to be still present in the water supply, the disinfection procedure shall be repeated.

E. All testing costs shall be paid by Contractor.

3.04 FIELD QUALITY CONTROL

A. Section 01 45 00 - Quality Control: Field inspection and testing.

B. Samples for bacteriological analysis shall be collected in sterile bottles.

C. Two or more successive test samples indicating bacteriological satisfactory water shall be obtained a minimum of 24 hours apart, before any system is placed into operation.

END OF SECTION

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SECTION 33 15 00
PIPELINE PRESSURE AND LEAKAGE TESTING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Field hydrostatic pressure and leakage testing of water mains and associated appurtenances.

B. Related Sections include, but are not limited to:

1. Section 01 33 00 - Submittal Procedures.
2. Section 01 45 00 - Quality Control.
3. Section 01 50 00 - Temporary Facilities and Controls.
4. Section 31 23 33 - Trenching and Backfilling.
5. Section 33 31 03 - Warning Tape and Tracer Wire.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS FOR INFORMATION

A. Testing Schedule and Procedure: A testing schedule and test procuedure shall be submitted to the ENGINEER for review and acceptance not less than 21 days prior to commencement of testing work. The Schedule shall indicate the proposed time and sequence of testing of the system. The testing procedure shall establish the limits of the system to be tested, the position of all valves during the testing, the location fo temporary bulkheads, disposal of test water, and all other methods and procedures to be followed in performiing the required testing work.

1.04 QUALITY ASSURANCE AND SPECIAL REQUIREMENTS

A. During testing of the watermain, all valves shall be in the open position.

B. Temporary bulkheads shall be provided durign testing so that the test pressures are not applied to existing or new valves and hydrants, or to existing water lines or to any portion that has been put into service of new lines installed under this Project.

C. The test shall be concducted before connections are made to existing watermains or to any portion that has been put into service or new water lines installed under this Project.

D. Upon completion of testing, connections made to existing force mains or to any portion that has been put into service of new water lines installed under this Project shall be visually inspected for leakage after placing the water line into service and before backfilling the connection.

PART 2 PRODUCTS

2.01 MATERIALS

A. Test Equipment:

1. All necessary piping connections between the line to be tested and the water source, together with pumping equipment, water meter, pressure gauges, backflow protection, and other equipment, materials, and facilities required to perform the specified tests, shall be provided. All flanges, valves, bulkheads, bracing, blocking, and other sectionalizing devices shall be provided. All temporary sectionalizing devices shall be removed upon completion of testing. Vents shall be provided in test bulkheads where necessary to expel air from the line to be tested
2. Test pressures to be applied by means of a force pump sized to provide and maintain the required pressure without interruption during the test.
3. Water meters and pressure gauges shall be accurately calibrated and shall be subjected to review and acceptance by the ENGINEER.
4. Permanent gauge connections shall be installed at each location where test gauges are connected to the pipeline in manholes during performance of required tests. Drilling and tapping of pipe walls will not be permitted. Upon completions of testing work, each gauge connection shall be fitted with a removable plug or cap acceptable to the ENGINEER.

PART 3 EXECUTION

3.01 PREPARATION

A. When filling the pipe with water, care shall be taken to ensure that all air release valves and other venting devices are properly installed in the open position. Hand-operated vent valves shall not be closed until water flows in an uninterrupted stream from each valve. Care shall be taken to ensure that the rate at which the line is filled with water does not exceed the venting capacity of the installed air vent valves and devices.

B. Piping shall be adequately blocked, anchored, and supported before the test pressure is applied. Underground piping shall be tested before the joints are covered.

3.02 PRESSURE TESTING

A. Subject newly installed pipe to a leakage and hydrostatic pressure test at test pressure of 200 psi for a period of two (2) hours. The pressure drop during the last hour of the test shall be less than 2 psi. Provide test pump, pipe taps, connecting piping, test gauge and all necessary appurtenances.

B. Fill newly installed pipe with water a minimum of 24 hours before the test and expel all air from the main.

C. Avoid development of waterhammer in pipeline.

D. Add make-up water from a vessel of known volume whenever gauge pressure at the testing point falls 5 psi below the required test pressure, or on a continuous basis if a suitable by-pass test pump is used, when performing the test.

E. Pressure test service leads and laterals with water mains prior to connection to user services.

F. Test agianst closed valves block to block.

G. Locate and repair any visible leaks and any defective areas if test fails.

H. Retest after completion of repairs.

I. Repeat procedure until tests pass.

J. Leakage shall not exceed the allowances indicated:

Nominal Pipe Size(inches)	Allowable Leakage in U.S. Gallons per Hour for 1000 linear feet
	Average Test Pressure in Line: 125 psi
1	0.09
1.5	0.14
2	0.18
3	0.28
4	0.37
6	0.55
8	0.74
10	0.92
12	1.10
14	1.29
16	1.47
18	1.66
20	1.84
24	2.21

30	2.76
36	3.32

Note: If pipeline test section includes various diameters, then allowable leakage shall be the sum of the computed leakage for the applicable lengths of each size.

3.03 LEAKAGE TESTING

A. Following completion of pressure testing and acceptance by the ENGINEER, the pipeline shall be subjected to a leakage test. The duration of the leakage test shall be 2 hours plus the additional time required by the ENGINEER for an accurate determination of line leakage.

B. The hydrostatic pressure maintained during leakage test shall be at least 90 percent but not more than 100 percent of the pressure specified for pressure testing of the pipeline and shall be maintained within plus or minus 5 percent during the entire time that leakage measurements are being performed.

C. Measurements of leakage shall not be attempted until all trapped air has been vented and a constant test pressure has been established. After the pressure has stabilized, line leakage shall be measured by means of a suitable water meter installed in the pressure supply piping on the pipeline side of the force pump.

D. The term "leakage", as used herein, shall be the total amount of water, which must be introduced into the line during the leakage test to maintain the test pressure.

E. No pipeline will be accepted if and while it exhibits a leakage rate in excess of that determined by the following formula:

$$Q = 0.0075\ DLN$$

Where Q = Allowable leakage in gallons per hour

D = Nominal diameter of pipe in inches

L = Length of section tested in thousand feet

N = Square root of average test pressure in psi

1. Whenever the pipeline to be tested contains pipe of different diameters, the allowable leakage shall be calculated separately for each diameter and corresponding length of line. The resulting allowable leakage rates shall be added to obtain the total allowable leakage for the entire pipeline.

F. All joints in piping shall be watertight and free from visible leaks during the leakage test. Each leak which is discovered within the correction period

stipulated in the General Conditions shall be repaired by and at the expense of the CONTRACTOR regardless of any amount that the total line leakage rate, during the leakage test, may have been below the specified allowable leakage rate.

G. If the leakage test indicates a line leakage rate exceeding the allowable, the CONTRACTOR shall locate and repair leaking joints and other defective items to the extent required to reduce the line leakage to an acceptable amount.

H. Operational Inspection

1. Before substantial completion of the work and in the presence of the ENGINEER and the CONTRACTOR, representatives of the OWNER shall operate all valves, hydrants, and water services to ascertain that the entire facility is in good working order; that all valve boxes are centered and valves are opened; that all hydrants operate and drain properly; that all curb boxes are plumb and centered; and that water is available at all curb stops.

END OF SECTION

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PRESSURE TEST REPORT
FOR

Williston WRRF Reuse Project

Date: _____

Location: _____
Stations/Length: _____
Street: _____
Pipe Size _____

Start
Time: _____ Start Pressure: _____

Time: _____ Pressure Drop: _____ Water Added: _____

Time: _____ Pressure Drop: _____ Water Added: _____

Time: _____ Pressure Drop: _____ Water Added: _____

Time: _____ Pressure Drop: _____ Water Added: _____

Ending
Time: _____ Ending
Pressure: _____ Total
Water Added: _____

Allowable Leakage: _____
_____
_____

Passed: _____ Failed: _____

Remarks: _____
_____
_____
_____

Contractor: _____ Engineer: _____

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SECTION 33 31 03
WARNING TAPE AND TRACER WIRE

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Tracer Wire.
2. Tracer Wire Access Box.
3. Warning Tape

B. Related Sections include, but are not limited to:

1. Section 01 33 00 - Submittal Procedures.
2. Section 01 45 00 - Quality Control.
3. Section 01 50 00 - Temporary Facilities and Controls.
4. Section 31 23 33 - Trenching and Backfilling.
5. Section 33 05 07 - Trenchless Installation of Utility Piping
6. Section 33 10 00 - Water Utilities.

1.02 SUBMITTALS

A. Submit manufacturer's data on materials furnished indicating compliance with the specifications.

PART 2 PRODUCTS

2.01 TRACER WIRE MATERIALS

A. Approved Manufacturers:

1. Copper clad Steel (CCS) trace wire
   a. Open Trench
      1) Copperhead #12 High Strength part #1230-HS
      2) Approved Equivalent
   b. Directional Drilling/Boring
      1) Copperhead Extra High Strength part #1245*EHS
      2) Approved Equivalent
2. Connectors
   a. Copperhead 3-way locking connection part # LSC1230*
   b. DryConn 3-way Direct Bury Lug: Copperhead Part #3WB-01
   c. Approved Equivalent
3. Termination/Access

a. Curb Stop locations:
   1) Copperhead BoaBox125 or 150

   2) Approved Equivalent.

b. Non-Roadway access boxes applications:
   1) Trace wire access boxes Grade Level Copperhead adjustable lite duty Part #LD14*TP

   2) Approved Equivalent

c. Concrete / Driveway access box applications:
   1) Trace wire access boxes Grade Level Copperhead Part #CD14*TP 14"

   2) Approved Equivalent

d. Fire hydrant trace wire access box applications:
   1) Above ground two terminal with 1" conduit. Copperhead part #T3-75-F (Cobra T3 Test Station, denoting "f" includes mounting flange)

   2) Approved Equivalent

4. Grounding
   a. Drive in Magnesium Anode: Copperhead Part #ANO-1005 (1.5 lb)
   b. Approved Equivalent

B. Tracer Wire:

1. Direct bury wire. Installed on all underground utilities such as water reclaim pipes.
2. Trace wire shall have HDPE insulation intended for direct bury, color coated purple per APWA standard for the specific utility being marked.
3. Open Trench Trace wire - Trace wire shall be #12 AWG Copper Clad Steel, High Strength with minimum 450 lb. break load, with minimum 30 mil HDPE insulation thickness.
4. Directional Drilling/Boring Trace wire - Trace wire shall be #10 AWG Copper Clad Steel, Extra High Strength with minimum 1,150 lb. break load, with minimum 30 mil HDPE insulation thickness.

C. Trace Wire Connectors

1. All mainline trace wires shall be interconnected in intersections, at mainline tees and mainline crosses.
   a. Tees: the three wires shall be joined using a single 3-way lockable connector.

b. Crosses: the four wires shall be joined using a 4-way connector. Use of two 3-way connectors with a short jumper wire between them is an acceptable alternative.

2. Direct bury wire connectors – shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.
3. Non locking friction fit, twist on or taped connectors are prohibited.

D. Trace Wire Termination/Access

1. All trace wire termination points shall utilize an approved trace wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.
2. All grade level/in-ground access boxes shall be appropriately identified with “water” cast into the cap and be color coded.
3. A minimum of 2 ft. of excess/slack wire is required in all trace wire access boxes after meeting final elevation.
4. All trace wire access boxes must include a manually interruptible conductive/connective link between the terminal(s) for the trace wire connection and the terminal for the grounding anode wire connection.
5. Grounding anode wire shall be connected to the identified (or bottom) terminal on all access boxes.
6. Service Laterals on public property – Trace wire must terminate at an approved grade level/inground trace wire access box, located at the edge of the road right-of-way, and out of the roadway at all fire hydrants, curb stops, and service laterals.
   a. Curb Stop locations shall utilize an integrated curb and tracer box. Box shall be Copperhead BoaBox or approved equivalent.
7. Service Laterals on private property – Trace wire must terminate at an approved above-ground trace wire access box, affixed to the building exterior directly above where the utility enters the building, at an elevation not greater than 5 vertical feet above finished grade, or terminate at an approved grade level/in-ground trace wire access box, located within 2 linear feet of the building being served by the utility.
8. Hydrants – Trace wire must terminate at an approved above-ground trace wire access box, properly affixed to the hydrant grade flange. (affixing with tape or plastic ties shall not be acceptable)
9. Long-runs, in excess of 500 linear feet without service laterals or hydrants – Trace wire access must be provided utilizing an approved grade level/in-ground trace wire access box, located at the edge of the road right-of-way, and out of the roadway. The grade level/in-ground trace wire access box shall be delineated using a minimum 48” polyethylene

marker post, color coded per APWA standard for the specific utility being marked.

E. Tracer Wire Grounding

1. Trace wire must be properly grounded at all dead ends/stubs
2. Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20ft of #14 red HDPE insulated copper clad steel wire connected to anode (minimum 0.5 lb.) specifically manufactured for this purpose, and buried at the same elevation as the utility.
3. When grounding the trace wire at dead ends/stubs, the grounding anode shall be installed in a direction 180 degrees opposite of the trace wire, at the maximum possible distance.
4. When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the trace wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire shall be trimmed to an appropriate length before connecting to trace wire with a mainline to lateral lug connector.
5. Where the anode wire will be connected to a trace wire access box, a minimum of 2 ft. of excess/slack wire is required after meeting final elevation.

F. Prohibited Products and Methods

1. Un-insulated trace wire
2. Trace wire insulations other than HDPE
3. Non locking, friction fit, twist on or taped connectors
4. Brass or copper ground rods
5. Wire connections utilizing taping or spray-on waterproofing
6. Looped wire or continuous wire installations, that has multiple wires laid side-by-side or in close proximity to one another
7. Trace wire wrapped around the corresponding utility
8. Brass fittings with trace wire connection lugs
9. Wire terminations within the roadway, i.e. in valve boxes, cleanouts, manholes, etc.
10. Connecting trace wire to existing conductive utilities.

2.02 WARNING "TAPE" MATERIALS

A. "Terra Tape" as manufactured by REEF Industries, Inc., or approved equal.

B. Size: 3”.

C. Warning Tape Schedule and Warning Notice:

1. Reuse Water
   a. Color - Purple.
   b. Warning Notice - "Caution Pipeline Buried Below."

PART 3 EXECUTION

3.01 INSTALLATION

A. At each buried appurtenance, bring the tracer wire up to ground level to a point of easy connection for testing and appropriately mounted.

B. Tracer wire, access boxes, and accessories shall be incidental to the pipe installation cost.

3.02 TRACER WIRE

A. General

1. Trace wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal for distances in excess of 1,000 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.
2. Trace wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.
3. Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire, and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.
4. Trace wire shall be installed at the bottom half of the pipe and secured (taped/tied) at 5’ intervals.
5. Trace wire must be properly grounded as specified.
6. Trace wire on all service laterals/stubs must terminate at an approved trace wire access box located directly above the utility, at the edge of the road right-of-way, but out of the roadway. (See Trace wire Termination/Access)
7. At all mainline dead-ends, trace wire shall go to ground using an approved connection to a drive-in magnesium grounding anode rod, buried at the same depth as the trace wire. (See Grounding)
8. Mainline trace wire shall not be connected to existing conductive pipes. Treat as a mainline deadend, ground using an approved waterproof connection to a grounding anode buried at the same depth as the trace wire.

9. All service lateral trace wires shall be a single wire, connected to the mainline trace wire using a mainline to lateral lug connector, installed without cutting/splicing the mainline trace wire.
10. In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using approved splice connectors, and shall be properly grounded at the splice location as specified.

B. Water System

1. A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.
2. Lay mainline trace wire continuously, by-passing around the outside of valves and fittings on the North or East side.
3. Trace wire on all water service laterals must terminate at an approved trace wire anode located at the curb stop.
4. Above-ground tracer wire access boxes will be installed on all fire hydrants.
5. All conductive and non-conductive service lines shall include tracer wire.

C. Testing

1. All new trace wire installations shall be located using typical low frequency (512Hz) line tracing equipment, witnessed by the contractor, engineer and facility owner as applicable, prior to acceptance of ownership.
2. Verification shall be performed upon completion of rough grading and again prior to final acceptance of the project.
3. Continuity testing in lieu of actual line tracing shall not be accepted.

3.03 WARNING TAPE

A. Install the warning tape 24" below finished grade directly above and parallel with pipelines.

END OF SECTION

DIVISION 40
PROCESS INTEGRATION

SECTION 40 05 06
COUPLINGS, ADAPTERS, AND SPECIALS FOR PROCESS PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Furnishing and installation of the following, as indicated, in accordance with the provision of the Contract Documents:

B. Related Sections include:

1. Section 01 33 00 – Submittal Procedures.
2. Section 01 45 00 – Quality Controls.
3. Section 01 61 00 – Common Product Requirements.
4. Section 01 75 00 – Starting and Adjusting.
5. Section 01 77 00 – Closeout Procedures.
6. Section 01 78 23 – Operations and Maintenance Data.
7. Section 01 79 00 – Demonstration and Testing.
8. Section 09 90 00 – Painting
9. Section 40 05 07 - Hangers and Supports for Process Piping
10. Section 40 05 19 - Ductile Iron Process Pipe
11. Section 40 05 58 - Process Valves

1.02 SUBMITTALS

A. Shop Drawings and Product Data shall be submitted in accordance with specification Section 01 33 00.

B. Operations and Maintenance Data shall be submitted in accordance with specification Section 01 78 23.

1.03 QUALITY ASSURANCE

A. The equipment and material to be furnished under this Contract shall be in accordance with Section 01 45 00 Quality Controls and Section 01 61 00 Common Product Requirements.

1.04 REGULATORY REQUIREMENTS

A. All Products that come into contact with water intended for use in a Public Water System shall meet American National Standards Institute (ANSI)/National Sanitation Foundation (NSF) International Standards 60 and 61, as appropriate. A Product will be considered as meeting these standards if so certified by NSF,

the Underwriters Laboratories, or other organization accredited by ANSI to test and certify each Product.

1.05 WARRANTY REQUIREMENTS

A. A written warranty shall be provided for the equipment specified in this Section. The warranty shall be for a minimum period identified herein and shall begin from the date of Final Completion, as defined in Section 01 77 00. Such warranty shall cover all defects or failures of materials or workmanship that occur as the result of normal operation and service. No prorated warranty will be accepted.

1. Contractor's Warranty: One (1) Year.
2. Manufacturer’s Warranty: Minimum of one (1) year but not less than manufacturer’s standard warranty period.

PART 2 PRODUCTS

2.01 WORKING PRESSURE

A. Working pressure of pipe specialties to be equal to working pressure of connecting pipes, unless specified otherwise.

2.02 DISMANTLING JOINTS

A. AWWA C207 Class D Steel Flange

B. Ductile Iron Body

C. Stainless Steel Tie Rods

D. Manufacturer and Type:

1. Romac DJ400
2. Approved Equivalent

2.03 EXTENDED RANGE COUPLINGS

A. Ductile Iron Casting

B. Xylan 1424 Coated Grippers

C. Manufacturer and Type:

1. Romac Alpha Restrained Joint
2. Approved Equivalent

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's recommendations.

B. Install equipment in locations shown on the Drawings.

3.02 MECHANICAL JOINT RESTRAINT GLAND

A. Install per AWWA C600 and manufacturer’s recommended installation procedures.

3.03 DISMANTLING JOINTS

A. Pipe supports shall be provided on each side of joint within 12-inches. Pipe supports shall be in accordance with specification Section 40 05 07.

3.04 EXPANSION JOINTS

A. Pipe supports shall be provided on each side of joint within 12-inches. In the event the joint is mounted to a tank or pump one pipe support shall be required on end opposite of equipment. Pipe supports shall be in accordance with specification Section 40 05 07 - Hangers and Supports for Process Piping.

B. Pipe connecting to PTFE expansion joint shall contain a pipe support within 12-inches.

END OF SECTION

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SECTION 40 05 07
HANGERS AND SUPPORTS FOR PROCESS PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Pipe Hanger Supports.
2. Floor Pipe Supports.
3. Wall Pipe and Sleeves.
4. Bolted Rubber Annular Seals.
5. Anchors.

B. Related Sections include:

1. Section 01 33 00 – Submittal Procedures.
2. Section 01 45 00 – Quality Controls.
3. Section 01 61 00 – Common Product Requirements.
4. Section 01 75 00 – Starting and Adjusting.
5. Section 01 77 00 – Closeout Procedures.
6. Section 01 78 23 – Operations and Maintenance Data.
7. Section 01 79 00 – Demonstration and Testing.
8. Section 03 20 00 – Concrete Reinforcing.
9. Section 03 30 00 – Cast-In-Place Concrete.
10. Section 40 05 06 - Couplings, Adapters, and Specials for Process Piping
11. Section 40 05 19 - Ductile Iron Process Pipe
12. Section 40 05 58 - Process Valves

1.02 REFERENCES

A. Reference Standards include:

1. ANSI B 31.10: Pipe Supports.
2. ASTM A36: Structural Steel.
3. ASTM A325: High Strength Bolts for Structural Steel Joints.

1.03 SUBMITTALS

A. Shop Drawings and Product Data shall be submitted in accordance with specification Section 01 33 00.

1. Shop drawings shall be signed and sealed by a Registered Professional Engineer. Submittal shall include detailed plan and sections illustrating the layout of only the pipe system. Drawings shall include referenced

details that specify all sizes and hardware for all components of support. Include maximum loading of detailed support.

B. Operations and Maintenance Data shall be submitted in accordance with specification Section 01 78 23.

1.04 QUALITY ASSURANCE

A. The equipment and material to be furnished under this Contract shall be in accordance with Section 01 45 00 Quality Controls and Section 01 61 00 Common Product Requirements.

1.05 WARRANTY REQUIREMENTS

A. A written warranty shall be provided for the equipment specified in this Section. The warranty shall be for a minimum period identified herein and shall begin from the date of Substantial Completion, as defined in Section 01 77 00. Such warranty shall cover all defects or failures of materials or workmanship that occur as the result of normal operation and service. No prorated warranty will be accepted.

1. Contractor's Warranty: One (1) Year.
2. Manufacturer's Warranty: Minimum of one (1) year but not less than manufacturer's standard warranty period.

PART 2 PRODUCTS

2.01 GENERAL

A. In certain locations anchors, expansion joints, and pipe supports have been indicated on the Drawings, but no attempt has been made to indicate every restraint, anchor, and expansion joint. It shall be the Contractor's responsibility to provide a complete system of pipe supports, to provide expansion joints, and to anchor all piping in accordance with the requirements set forth herein.

B. Pipe supports and anchors shall be constructed entirely of stainless steel.

C. Pipe supports and anchors located within grate covered trenches shall be constructed entirely of stainless steel.

D. Pipe supports and anchors located within basins or are submerged shall be constructed entirely of stainless steel.

E. All other materials shall be as described within their individual sections.

2.02 DESIGN RESPONSIBILITY

A. When specific concrete and fabricated steel supports are shown, Contractor shall provide and install said supports as indicated on the Drawings. Any deviation from pipe shown supports within the Drawings shall only be allowed with the written consent of the Engineer of Record.

B. When pipe supports are not shown it shall be the responsibility of the Contractor to design, size, and layout pipe supports as specified herein and in accordance with the standard details provided in the Drawings.

C. Minimum requirements for support system are provided in Article 3.02 herein.

D. Design shall be provided by a Registered Professional Engineer who is a full time employee of the pipe support supplier.

E. Typical pipe supports shown on the Drawings may or may not be located in a manner that allows for direct bracing to a structural member that has sufficient capacity to resist the pipe support loads. The Contractor shall be responsible for adjusting and coordinating the location of supports with the Engineer. The Contractor shall be responsible for providing additional structural framing or modifications to specified structural framing.

F. Piping systems and pipe connections to equipment shall be properly anchored and supported to prevent undue deflection, vibration, dislocation due to seismic events and line pressures, and stresses on piping, equipment, and structures.

2.03 PIPE HANGER SUPPORTS

A. Pipe hangers for pipe greater than or equal to 12-inches nominal diameter shall utilize concrete inserts to support piping from new cast-in-place. If embedded channels are utilized channel shall not interfere with rebar cover.

B. Expansion anchors may be used for hangers supporting pipe less than 12-inches nominal diameter. Anchors shall be of the undercut design. Epoxy anchors shall not be allowed.

C. Minimum vertical adjustment: 1.5-inches.

D. Design hangers to support piping without disconnection of pipe.

E. Materials

1. Unless otherwise specified, all pipe supports shall comply with ANSI/MSS SP-58 and MSS SP-69. Materials of construction for fabricated steel supports are covered in the structural and miscellaneous metals section. All pipe support materials shall be packaged as necessary to ensure delivery in satisfactory condition.

2. Design loads for inserts, brackets, clamps, and other support items shall not exceed the manufacturer's recommended loads.
3. Pipe supports shall be manufactured for the sizes and types of pipe to which they are applied. Strap hangers will not be acceptable. Threaded rods shall have sufficient threading to permit the maximum adjustment available in the support item.
4. The use of supports that rely on stressed thermoplastic components to support the pipe will not be acceptable.
5. Contact between dissimilar metals shall be prevented. Supports for brass or copper pipe or tubing shall be copper plated. Portions of pipe supports which come into contact with other metals that are dissimilar shall be rubber or vinyl coated.
6. Anchorage shall be provided to resist thrust due to temperature changes, changes in diameter or direction, or dead-ending. Anchors shall be located as required to force expansion and contraction movement to occur at expansion joints, loops, or elbows, and as required to prevent excessive bending stresses and opening of mechanical couplings. Anchorage for temperature changes shall be centered between elbows and mechanical joints used as expansion joints.

F. Manufacturer and Type, or equivalent:

1. Light welded steel bracket:
   a. Anvil Figure 194.
2. Concrete Inserts:
   a. Unistrut P3760 Series Insert.
   b. Anvil Figure 152.
   c. Anvil Figure 282.
3. Undercut Anchors:
   a. Maxi-Bolt by Drillco Group.
   b. HDA Anchors by Hili.
4. Adhesive Anchors:
   a. Hilti HIT-HY 200.
5. Offset Pipe Clamp:
   a. Figure 103.
6. Adjustable Clevis Hanger:
   a. Figure 103.
7. Pipe Rollers and Supports:
   a. MSS SP 58 and MSS SP 69, Type 44.

2.04 FLOOR PIPE SUPPORTS

A. Approved Manufacturer and Type:

1. Trumbull Model TMAPSSSS
2. Approved Equivalent.

B. Minimum vertical adjustment: 4.5 inches.

C. Provide complete with riser pipe and flange bolts for floor mounting.

D. Provide precast concrete or grout base a minimum of 1” above floor.

E. Contractor may also be required to construct concrete saddle pipe supports for floor piping as indicated on the Drawings. Contractor to provide all materials, formwork, and labor to construct as detailed on Drawings.

2.05 WALL PIPE AND SLEEVES

A. All pipe penetrations through water bearing and exterior walls shall contain an integral water stop, or collar, located at the center of the wall. The water stop shall extend a minimum 3-inches past the outer diameter of the wall pipe.

B. Stainless steel wall pipe shall extend past the face of the wall and incorporated flanged end connections compatible with adjacent pipe. Stainless steel wall pipe with flanges cast flush with the wall shall not be acceptable. Refer to Drawings for Details.

C. Ductile iron wall pipe shall be mechanical style with ends cast flush with wall faces. Refer to Drawings for Details.

D. PVC wall pipes or sleeves shall be not allowed.

E. Size sleeves large enough to allow for installation of annular seal.

2.06 BOLTED RUBBER ANNULAR SEALS

A. Approved Manufacturers

1. Link Seal manufactured by Thunderline Corp.
2. Pen-Seal manufactured by Proco Products, Inc.
3. Approved Equivalent.

2.07 ANCHORS

A. Hollow Concrete Block and Brick Anchors:

1. Acceptable Manufacturer and Type:
   a. HIT S 12/A Combi Fastener manufactured by Hilti Corporation.
   b. Approved Equivalent.
2. Accessories: HY20 Adhesive with screen tube insert.

B. Use Type 316 stainless steel epoxy adhesive anchor bolts, injection adhesive anchors, or equal, for building or structure attachments. Provide continuous concrete inserts, Unistrut P3200 series, or equal, where applicable.

C. Mechanical anchor and powder-actuated drive-pin fasteners shall be used only with prior approval from the Engineer.

2.08 FABRICATION

A. Size sleeves large enough to allow for installation of annular seal.

B. Design hangers to support piping without disconnection of pipe.

2.09 FINISH

A. Factory coat steel hangers and supports as specified in Section 09 96 00.

B. Touch up finish on exposed steel hangers and supports in accordance with Section 09 96 00.

PART 3 EXECUTION

3.01 INSERTS

A. Provide and install inserts for placement in concrete formwork.

B. Provide and install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams and walls.

C. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.

D. Ensure adequate rebar cover is maintained as required in Section 03 30 00 and Section 03 20 00.

3.02 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

Pipe Size	Max Hanger/ Support Spacing	Min Hanger/ Support Rod Diameter
1/2 to 1-1/4 inch	6'-6"	3/8"
1-1/2 to 2 inch	10'-0"	3/8"
2-1/2 to 3 inch	10'-0"	1/2"
4 to 6 inch	10'-0"	5/8"
8 to 12 inch	10'-0"	7/8"
14 to 18 inch	10'-0"	1"
20 to 30 inch	10'-0"	1-1/2"
PVC/CPVC (all sizes)	5'-0"	1/2"

B. Install supports free standing or suspended to provide minimum 1/2 inch space between support and adjacent Work.

C. Place a hanger/support within 12 inches of each horizontal fitting, on each side of valves, on each side of rubber expansion joints, on each side of dismantling joints, and within 12 inches of any wall pipe connection.

D. Support riser piping independently of connected horizontal piping.

3.03 SLEEVES

A. Set sleeves in position in formwork. Provide reinforcing around sleeves.

B. Extend sleeves through floor one inch above finished floor level.

C. Where piping penetrates floor, ceiling, or wall, close off space between pipe and sleeve with link seal.

3.04 THRUST ANCHORS AND GUIDES

A. For suspended piping, center thrust anchors as closely as possible between expansion joints and between elbows and expansion joints. Anchors shall hold pipe securely and shall be sufficiently rigid to force expansion and contraction movement to take place at expansion joints and/or elbows and to preclude separation of joints.

B. Provide thrust anchors as required to resist thrust due to changes in diameter or direction or dead end of pipelines. The design of all anchors shall be subject to approval by Engineer. Anchorage shall be required wherever bending stresses exceed allowable for pipe. Wall pipes may be used as thrust anchors.

C. Pipe guides shall be provided adjacent to sliding expansion joints in accordance with the recommendations of the National Association of Expansion Joint Manufacturers.

3.05 INSERTS AND ANCHORS

A. Furnish and install inserts or anchors for placement in concrete.

B. Furnish and install inserts or anchors for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams and walls.

C. Utilize support assemblies designed for the appropriate loads. Contractor shall verify design conditions of each piping system.

D. Mechanical anchor and powder-actuated drive-pin fasteners shall be installed in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions. Non-adhesive anchors shall be only used with prior approval from the Engineer.

3.06 PAINTING

A. Prime coat non-galvanized steel hangers and supports.

B. Finish coat all hangers and supports under provisions of Specification Section 09 96 00.

END OF SECTION

SECTION 40 05 19
DUCTILE IRON PROCESS PIPE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Furnishing and installation of the following, as indicated, in accordance with the provision of the Contract Documents:
2. Pipe, fittings, wall pipes, connections, and gauges associated with:
   a. Ductile Iron Pipe and Fittings.

B. Related section include:

1. Section 01 33 00 – Submittal Procedures.
2. Section 01 45 00 – Quality Controls.
3. Section 01 61 00 – Common Product Requirements.
4. Section 01 75 00 – Starting and Adjusting.
5. Section 01 77 00 – Closeout Procedures.
6. Section 01 78 23 – Operations and Maintenance Data.
7. Section 01 79 00 – Demonstration and Training.
8. Section 09 96 00 - High Performance Coatings
9. Section 40 05 58 - Process Valves

1.02 QUALITY ASSURANCE

A. The equipment and material to be furnished under this Contract shall be in accordance with Section 01 45 00 Quality Controls and Section 01 61 00 Common Product Requirements.

B. Piping modifications subject to Engineer's review. No additional compensation allowed for modifications required to suit equipment furnished by Contractor.

1.03 REFERENCES

A. Reference Standards include:

1. ANSI/AWWA C104/A21.4: Cement-Mortar Lining for Gray-Iron and Ductile-Iron Pipe and Fittings for water.
2. ANSI/AWWA C105/A21.5: Polyethylene Encasement for Gray and Ductile Cast-Iron Piping for water and other liquids.
3. ANSI/AWWA C110/A21.10-98: Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm Through 1,219 mm), for Water.
4. ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

5. ANSI/AWWA C115/A21.15: Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
6. ANSI/AWWA C150/A21.50: Thickness Design of Ductile-Iron Pipe.
7. ANSI/AWWA C151/A21.51: Ductile-Iron Pipe, Centrifugally Cast In Metal Molds or Sand Lined Molds for water or other liquids.
8. ANSI/AWWA C208: Dimensions for Fabricated Steel Water Pipe Fittings.
9. ANSI/AWWA C219: Bolted, Sleeve-Type Couplings for Plain-End Pipe.
10. AWWA C600-10: Installation of Ductile-Iron Water Mains and Their Appurtenances.
11. AWWA C606-11: Grooved and Shouldered Joints.
12. AWWA C651-05: Standard for Disinfecting Water Mains.
13. AWWA C653-03: Disinfection of Water Treatment Plants.
14. NSF Standards No. 60 and 61: National Sanitation Foundation.

1.04 SUBMITTALS

A. Submit Shop Drawings in accordance with Section 01 33 00 for all pipe and fittings indicating: Name of Manufacturer, Materials, Standard Dimensions, References, and Joint Data.

B. Piping coordination drawings are to be supplied by the pipe manufacture or the fitting manufacture only for all piping 6” and larger. These drawings are to be submitted to the engineer and are to indicate elevations, center lines, equipment locations, pipe lengths, fittings, valves and appurtenances via a bill of material.

C. Submit Affidavit of Compliance for ductile iron pipe and fittings. The affidavit letter from the pipe and fitting manufacturers shall include stating the product(s) are supplied new from the manufacturer and all linings required by the specification for the pipe or fittings are supplied by the manufacturer and are covered by the manufacturer’s warranty.

D. Submit design calculations for structural design of pipe thickness where pipe class or thickness is not specifically called out.

E. Grooved/shouldered joint couplings and fittings shall be shown on drawings and product submittals, and shall be specifically identified with the applicable style or series designation.

F. Submit written certification from the grooved/shouldered component manufacture that all grooved/shouldered components (couplings, fittings, valves, gaskets, bolts and nuts) are of the same manufacture and grooving tools are of the same manufacturer as the grooved/shouldered components.

G. Operations and Maintenance Data shall be submitted in accordance with specification Section 01 78 23.

H. Certification that all materials in contact with treated or potable water are ANSI/NSF 61 approved.

1.05 PAINTING AND IDENTIFICATION SYSTEMS

A. All material and equipment in this section shall be factory primed. Primer shall be compatible with finish coats of paint provided under Section 09 96 00.

B. The Contractor shall refinish and restore to the original appearance all equipment that has sustained damage to the manufacturer's finish or prime coats of paint or enamel.

C. Finish painting of all materials and equipment in this Section shall be the responsibility of the Contractor, and shall be as described in Section 09 96 00, unless otherwise specifically indicated.

D. Provide process pipe identification per Section 40 05 97 - Identification for Process Equipment.

1.06 REGULATORY REQUIREMENTS

A. All Products that may come into contact with water intended for use in a Public Water System shall meet American National Standards Institute (ANSI)/National Sanitation Foundation (NSF) International Standards 60 and 61, as appropriate. A Product will be considered as meeting these standards if so certified by NSF, the Underwriters Laboratories, or other organization accredited by ANSI to test and certify each Product.

1.07 WARRANTY REQUIREMENTS

A. A written warranty shall be provided for the equipment specified in this Section. The warranty shall be for a minimum period identified herein and shall begin from the date of Substantial Completion, as defined in Section 01 77 00. Such warranty shall cover all defects or failures of materials or workmanship that occur as the result of normal operation and service. No prorated warranty will be accepted.

1. Contractor 's Warranty: One (1) Year.
2. Manufacturer's Warranty: Minimum of one (1) year but not less than manufacturer's standard warranty period.

PART 2 PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

A. Approved Manufacturers:

1. American Cast Iron Pipe Company.

2. U.S. Pipe.
3. Approved Equivalent.

B. General

1. Minimum Pressure Class.
   a. Interior and Exterior, flanged:
      1) 12 inch diameter and smaller: 350 PSI.
      2) 14 inch diameter and larger: 250 PSI.
   b. Interior and Exterior, grooved and shouldered:
      1) 12 inch diameter and smaller: 350 PSI.
      2) 14 inch thru 18 inch diameter: 250 PSI.
      3) 20 inch thru 36 inch diameter: 150 PSI.
      4) 42 inch diameter and larger: 175 PSI.
   c. Buried, Mechanical and push-on joints:
      1) 12 inch diameter and smaller: 350 PSI.
      2) 14 inch diameter and larger: 250 PSI.
2. On Site inspection of all materials by Contractor.
3. Pipe Coating:
   a. Buried and Submerged: Bituminous Coating (asphalt coating).
   b. Interior and Exposed: Prime Coat.
4. Bolts and nuts:
   a. Buried and Submerged: Stainless steel.
   b. Interior and Exposed: Zinc coated, ASTM A307.
5. Pipe lining:
   a. All ductile iron pipe and fittings shall be cement mortar lined.
   b. Ductile iron pipe for air lines shall be unlined.
6. Pipe and Fitting Coatings:
   a. All ductile iron pipe and fittings installed within a manhole shall have a zinc rich primer coating (Tnemec 91-H2O Hydro-Zinc at 2.5 to 4 mils DFT or approved equal), an intermediate coat of an epoxy (Tnemec Series N140 Pota Pox Plus at 4.0 to 6.0 mils DFT or approved equal), and a finish coat of an epoxy (Tnemec Series N140 Pota Pox Plus at 4.0 to 6.0 mils DFT or approved equal). Finished color shall be Barney Purple.
7. Submit design calculation for structural design of pipe thickness where pipe thickness or class is not specifically called out.
8. Mechanical Joint Glands: Ductile iron retainer type.
9. Polyethylene encase (wrap) all buried pipe and fittings.
10. Pipe and fittings to match face and drill of valves.
11. All flanges shall be full-faced flanges.

12. All materials to be new and unused.
13. Pipe and fitting material: Ductile iron.

C. Pipe: ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51.

D. Gaskets: Fully Faced, Styrene-Butadiene Rubber (SBR) meeting AWWA C110, Appendix A.

E. Flanged Pipe: ANSI/AWWA C115/A21.15.

1. Minimum Class: Class 150.

F. Grooved and Shouldered Pipe: ANSI/AWWA C606

1. Grooved Minimum Class: Class 53
2. Shouldered Minimum Class: Class 350.

G. Fittings:

1. Flanged, Grooved and Shouldered fittings:
   a. Conform to ANSI/AWWA C110/A21.10.
   b. Full Face Gaskets, Bolts, and Nuts: AWWA C110, Appendix A.
   c. Grooved and Shouldered – Conform to ANSI/AWWA C606.
   d. Material: Ductile Iron.
2. Reducers: All reducers shall be concentric pattern unless noted otherwise on the Drawings.

H. Joints – Pipe and Fittings:

1. Push-on: ANSI/AWWA C111/A21.11.
2. Mechanical: ANSI/AWWA C111/A21.11.
3. Mechanical Joints with Tie Rods:
   a. Tie rods: ASTM A307.
   b. Steel pipe: ASTM A53, standard weight.
   c. Washers: ANSI B18.22.1, plain steel.
   d. Threaded connections
      1) ANSI/ASME B1.20.1, NPT
   e. See details on drawings.
4. Flanged: ANSI/AWWA C110/A21.10 and ANSI/AWWA C115/A21.15.
5. Provide type of joint as indicated on Drawings.
6. Use of bolted split sleeve couplings conforming to AWWA C219 performance standard are acceptable in lieu of bolted sleeve couplings, flange coupling adapters and dismantling joints.
   a. Housing and Closure plates to be manufactured of ASTM A-36 carbon steel. End rings will meet or exceed the requirements of ASTM A-108, grade 1020 cold rolled carbon steel. Nuts and Bolts are to be of Zinc coated, ASTM A307 carbon steel. Gaskets are to be isoprene rubber.

b. Victaulic Depend-O-Lok ExE (unrestraint). Requiring external restraint.
c. Victaulic Depend-O-Lok FxF (restraint) using end rings supplied by the coupling manufacture and welded to the pipe OD as per the coupling manufacture's installation instructions and weld detail for the specific application.

7. Use of grooved and shouldered joints is acceptable in lieu of flanged joints.
   a. Conform to AWWA C606.
   b. Couplings shall consist of two or more ductile iron housing segments conforming to ASTM A536, elastomer gasket, and zinc-electroplated steel or stainless steel bolts and nuts.
      1) Grooved coupling - Victaulic Style 31.
      2) Shouldered coupling – Victaulic Style 44.
      3) Grooved flange adapter – Victaulic Style 341.
      4) Transition to grooved end IPS to Ductile Iron pipe and fittings - Victaulic Style 307 couplings may be used on 3" thru 12" pipe.
      5) Groove coupling and groove flange adapter gaskets are to be rated by the coupling manufacture of an elastomer grade suitable for the intended service. Gaskets shall be molded and produced by the coupling manufacturer. Gasket are to be of elastomer material with properties as designated in ASTM D-2000 and design molded of synthetic rubber with a short center leg which shall bridge the pipe ends offering an initial seal on the leading edge of the pipe ends.

8. Uni-Flanges or approved equivalent must receive prior approval from the Engineer for each proposed location.

I. Wall sleeves: Wall sleeve shall be provided where ductile iron pipe passes through concrete walls unless a wall pipe is used.

PART 3 EXECUTION

3.01 PREPARATION

A. Make necessary field measurements to determine pipe laying lengths; fabricate pipe; deliver pipe to Site; store pipe with ends capped to prevent contamination and damage to interior; prepare pipe for installation; work pipe into place without forcing or springing.

B. Do not store or ship small diameter pipe inside larger diameter pipe.

C. Ream pipe and tube ends. Remove burrs. Repair lining at pipe cuts.

D. Remove scale and dirt, inside and outside, before assembly.

E. Remove welding slag or foreign material from pipe and fitting materials.

F. Remove temporary preservative coatings from valves, fittings, and appurtenances prior to installation.

G. Clean, repair, or replace equipment malfunctioning due to presence of foreign material left in piping during installation or entering piping after installation due to Contractor's work at no cost to Owner.

H. All work performed and material furnished shall be inspected by the Contractor, but such inspection shall not relieve the manufacturer of responsibility to furnish material and perform work in accordance to this specification.

3.02 DUCTILE IRON PIPE AND FITTINGS

A. Joints:

1. Buried: Push-on or Mechanical.
2. Interior submerged: Flanged or grooved and shouldered.
3. Interior exposed: Flanged or grooved and shouldered, except where indicated otherwise on the Drawings.

B. Mechanical Joints:

1. Carefully assemble in accordance with the manufacturer’s recommendation.
2. Bolts shall be uniformly tightened to the torque values listed in Appendix A of ANSI/AWWA C111/A21.11. Overtightening of bolts to compensate for poor installation practice will not be permitted.
3. The holes in mechanical joints with tie rods shall be carefully aligned to permit installation of the tie rods.

C. Flanged Joints:

1. Pipe shall extend completely through screwed-on flanges. The pipe end and flange face shall be finish machined in a single operation. Flange faces shall be flat and perpendicular to the pipe centerline.
2. Care shall be taken to avoid restraint on the opposite end of the pipe or fitting which would prevent uniform gasket compression or would cause unnecessary stress in the flanges when bolting flanged joints.
3. One flange shall be free to move in any direction while the flange bolts are being tightened. Bolts shall be gradually tightened and at a uniform rate, to ensure uniform compression of the gasket.
4. Special care shall be taken when connecting piping to pumping equipment to ensure that piping stresses are not transmitted to the pump

flanges. All connecting piping shall be permanently supported so that accurate matching of bolt holes and uniform contact over the entire surface of the flanges is obtained before any bolts are installed in the flanges.

D. Grooved Joints:

1. Grooved joints shall be installed in accordance with the manufacturer's latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be of an elastomer grade suitable for the intended service, and shall be molded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative shall provide on-site training for Contractor's field personnel in the use of grooving tools and installation of grooved joint products. The representative shall periodically visit the jobsite and review Contractor is following best recommended practices in grooved product installation. (A distributor's representative is not considered qualified to conduct the training or jobsite visit(s).)

E. Penetrations:

1. Install pipe straight through concrete walls or floors.
2. Provide wall sleeves where ductile iron pipe passes through concrete walls and floors, unless specified otherwise on Drawings.
3. Extend pipe such that the end extends 4" beyond the face of the wall unless specified otherwise on Drawings.
4. Install embedded wall flange in center of wall or floor and grout in place when embedded wall pipe flange shown on Drawings.
5. Fabricate wall pipes to dimensions required.

F. Support pipe at fittings with rods; anchor and support in accordance with Section 40 05 07 - Hangers and Supports for Process Piping.

G. Pipe and fittings to match face and drill of valves and appurtenances.

3.03 THREADED JOINTS

A. Pipe threads shall conform to ANSI/ASME B1.20.1, NPT, and shall be fully and cleanly cut with sharp dies. Not more than three threads at each pipe connection shall remain exposed after installation. Ends of pipe shall be reamed after threading and before assembly to remove all burrs.

3.04 DISSIMILAR PIPE CONNECTIONS

A. Provide non-conducting connections or flange insulating gasket kits wherever jointing dissimilar metals in open systems.

3.05 TESTING

A. Typical test pressure shall be 1.5 times the normal operating pressure of the pipe, not to exceed the pressure rating of the pipe.

B. All joints shall be watertight and free from leaks. All leaks shall be repaired by and at the expense of the Contractor.

3.06 DISINFECTION

A. Disinfect process and miscellaneous water piping accordance with AWWA C651 and AWWA C653.

END OF SECTION

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SECTION 40 05 58
PROCESS VALVES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Furnishing and installation of the following, in accordance with the provisions of the Contract Documents.
   a. Gate Valves.
   b. Swing Check Valves.
   c. Ball Valves.
   d. Air and Vacuum Release Valves.
   e. Pressure Reducing Valves.
   f. Pressure Sustaining Control Valves.
   g. Duckbilled Check Valve

B. Reference Standards Include:

1. AWWA C504: Rubber-Seated Butterfly Valves.
2. ANSI/AWWA C507: Ball Valves, 6 In. Through 60 In.
3. AWWA C509: Resilient-Seated Gate Valves for Waterworks Services, 2 inches through 24 inches NPS.
4. AWWA C512: Air-Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.
5. AWWA C515: Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.
6. ANSI/AWWA C541: Hydraulic and Pneumatic Cylinder and Vane- Type Actuators for Valves and Slide Gates.
7. ANSI/AWWA C542: Electric Motor Actuators for Valves and Slide Gates.
8. AWWA C550: Protective Epoxy Interior Coatings for Valves and Hydrants.
9. ANSI/AWWA C561: Fabricated Stainless Steel Slide Gates.
10. ANSI/AWWA C563: Fabricated Composite Slide Gates.
11. ASTM D-1784: Rigid Polyvinyl Chloride Compounds and Chlorinated Polyvinyl Chloride Compounds.
12. ASTM-D2464: Threaded Polyvinyl Chloride Plastic Pipe Fittings, Schedule 80.
13. ASTM F437: Threaded Chlorinated Polyvinyl Chloride Plastic Pipe Fittings, Schedule 80.
14. ASTM A351 CF8M: Standard Specification for Castings,
15. Austenitic, for Pressure-Containing Parts
16. ANSI B16.5: American National Standard Pipe Flanges and Flanged Fittings.

17. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc. Standard Practice 67.

1.02 SUBMITTALS

A. Shop Drawings and Product Data shall be submitted in accordance with specification Section 01 33 00 and shall include detailed specifications, drawings, and data covering all materials, parts, devices, equipment, and other accessories forming part of equipment for the complete operational system.

B. Operations and Maintenance Data shall be submitted in accordance with specification Section 01 78 23.

1.03 QUALITY ASSURANCE

A. The equipment and material to be furnished under this Contract shall be in accordance with Section 01 45 00 Quality Controls and Section 01 61 00 Common Product Requirements.

1.04 WARRANTY REQUIREMENTS

A. A written warranty shall be provided for the equipment specified in this Section. The warranty shall be for a minimum period identified herein and shall begin from the date of Substantial Completion, as defined in Section 01 77 00. Such warranty shall cover all defects or failures of materials or workmanship that occur as the result of normal operation and service. No prorated warranty will be accepted.

1. Contractor's Warranty: One (1) Year.
2. Manufacturer's Warranty: Minimum of one (1) year but not less than manufacturer's standard warranty period.

PART 2 PRODUCTS

2.01 GENERAL

A. Provide valves with manufacturer's name and pressure rating clearly marked on outside of body.

B. The tag number designated by the Engineer, as indicated in the Process Schedules, shall be stamped on a corrosion-resistant plate attached to both the actuator and valve.

C. Unless otherwise indicated, use valves suitable for 150 psi minimum working pressure. Valves off the high service pipeline should be suitable to 200 psi minimum working pressure.

D. Valve Operators, as shown on Drawings or as specified.

E. Valve materials shall be compatible with the liquid or chemical service for that particular valve and consistent with piping materials. Contractor shall submit valve service to Owner and Engineer for confirmation of chemical compatibility.

F. A valve schedule is provided on the Drawings for Contractor's convenience and the Engineer does not warrant the accuracy of valves, operators, locations, connections, or other requirements. Contractor shall verify all valve sizes and requirements with the Drawings and Specifications and notify Engineer of any discrepancies.

2.02 VALVE CONNECTIONS

A. Provide valves suitable to connect to adjoining piping as specified for pipe joints. Use full port size valves, unless otherwise specified.

B. Thread pipe sizes 1-1/2 inches and smaller unless indicated otherwise.

C. Flange pipe sizes 2 inches and larger unless indicated otherwise.

D. PVC/CPVC pipe to be glued true union unless indicated otherwise.

E. Metallic valves in chemical services shall have socket weld ends or flanges as indicated in the Drawings.

F. Valves connected to tanks in chemical services shall be flanged.

2.03 GATE VALVES

A. Approved Manufacturers

1. Mueller
2. American
3. Approved Equivalent

B. Design:

1. Comply with MSS SP 70 and AWWA C
2. Iron body and epoxy-coated.
3. Rated for minimum 200 psi working pressure and 400 psi test pressure.
4. Stainless steel interior and exterior bolts, bronze trim.
5. Single wedge with resilient seat.
6. End Connections: Flanged ends.
7. Valves shall be the non-rising type.
8. Operator: Handwheel or square nut, as indicated on the Drawings. Provide arrow showing direc
    a. For square nut operated valves, provide an extension, valve box (where applicable) and one (1) T-wrench of appropriate length for operation.

2.04 SWING CHECK VALVES

A. Type 1:

1. Swing type with spring and lever, non-slamming design.
    a. Seat: Bronze
    b. Seal: Buna-N
    c. End Connections: Flanged
    d. Rating: 200 psig
2. Service - for general service use.
3. Approved Manufacturer and Type:
    a. APCO Model CVS-6000 Swing Check Valve.
    b. Crispin SWL Series Swing Check Valve.
    c. Clow Horizontal Swing Check Valve.
    d. Approved Equivalent.
4. Design:
    a. Lever and weight design.
    b. Body and Cover: Ductile Iron, ASTM A536, Grade 65-45-12.
    c. Disc and Disc Arm: Ductile Iron A536.
    d. Body Seat: Stainless Steel.
    e. Disc Seat: Buna-N.
    f. Internal Components: Stainless Steel.
    g. Flow area through body: equal to or greater than area of equivalent size pipe.
    h. End Connections: Flanged ends.
    i. Pressure Rating: ANSI Class 150.

2.05 BALL VALVES

A. Manual ball valves up to 2-inch size:

1. Approved Manufacturers and Type:
    a. Bray Flow-Tek Series S51.
    b. Watts Regulator Company Series B-6000 ball valve.
    c. Apollo 70 Series ball valve.
    d. KZ Valves Series 61 ball valve.
    e. Approved Equivalent.
2. Design:
    a. Body: Bronze or stainless steel.
    b. Ball and stem: Stainless steel.
    c. Seats: Glass-reinforced durafill or virgin PTFE.

B. Operation

1. Quarter turn shut off.
2. Provide accessories (including compression fittings, NPT adaptors, etc.) to ensure complete operating system. All accessories shall be corrosion resistant to the chemical application.

2.06 AIR AND VACUUM RELEASE VALVES

A. Approved Manufacturers and Type:

1. APCO
2. Val-Matic
3. Crispin
4. Approved Equivalent.

B. Material:

1. Body and Cover: Cast iron, ASTM A126.
2. Float: Stainless steel, ASTM A240.
3. Seat: Buna-N or other suitable material to seal with low water pressure.
4. Linkage: Stainless steel.
5. Needle: Stainless steel.
6. Other Internal Parts: Stainless steel.

C. Size:

1. 1-inch inlet, 1-inch outlet, 1/16-inch orifice.
2. Sized for 500 gpm flow rate, 300 psi pressure rating.

D. Spare Parts: Provide one (1) spare cover gasket for each different size and type of air and vacuum release valve.

E. Function: Release large quantities of air from the system and allow air to re-enter the system upon loss in pressure. Located at pump discharges of filtrate pumps.

F. Flanged discharge of the valve shall be piped to discharge towards the drain. A minimum 2-inch air gap, at least 18 inches above the floor, should be provided between the discharge piping from the air valve and the piping directed towards the drain.

G. Air/Vacuum valves shall be fully automatic float operated valves designed to exhaust large quantities of air during the pipe filling of piping systems and close upon liquid entry. The valve shall re-open during draining or if a negative pressure occurs.

H. Connections

1. Valve sizes 2½ in. and smaller shall have full size NPT inlets and outlets equal to the nominal valve size. The body inlet connection shall be hexagonal for a wrench connection.
2. Valve sizes 3 in. and larger shall have bolted flange inlets with threaded or plain outlets and protective hoods to prevent debris from entering the valve. Flanges shall be in accordance with ANSI B16.1 for Class 125 or

Class 250 iron flanges and ANSI B16.5 for Class 150 or Class 300 steel flanges.

3. The valve shall have two additional NPT connections for the addition of Air Release Valves, gauges, testing, and draining.

I. Design

1. The valve body shall provide a through flow area equal to the nominal valve size. A bolted cover with alloy screws and flat gasket shall be provided to allow for maintenance and repair.
2. Floats shall be unconditionally guaranteed against failure including pressure surges. The float shall have a hexagonal guide shaft supported in the body by circular bushings to prevent binding from debris. The float shall be protected against direct water impact by an internal baffle.
3. The resilient seat shall provide drop tight shut off to the full valve pressure rating. The seat shall be a minimum of 0.5 in. thick on 2 in. and larger valves and secured in such a manner as to prevent distortion. Valves with working pressures above 400 psig shall have metal seats with synthetic seals.

J. Materials

1. The valve body, cover, and baffle shall be constructed of ASTM A126 Class B cast iron for Class 125 and Class 250 valves. Class 300 ductile iron valves shall be constructed of ASTM A536 Grade 65-45-12 ductile iron. Class 300 steel valves shall be constructed of ASTM A216 Grade WCB cast steel.
2. The float, guide shafts, and bushings shall be constructed of Type 316 stainless steel. Non-metallic guides and bushings are not acceptable. Resilient seats shall be Buna-N. Class 300 steel valves shall have a 316 stainless steel Seat with Buna-N seal to provide an initial contact to Buna-N with final metal to metal contact to prevent over compression of the resilient seal.

K. Manufacturer

1. The manufacturer shall demonstrate a minimum of five (5) years of experience in the manufacture of air valves. When requested, the manufacturer shall provide test certificates, dimensional drawings, parts list drawings, and operation and maintenance manuals.
2. The exterior of the valve shall be coated with a universal alkyd primer.

2.07 PRESSURE REDUCING VALVE

A. Approved Manufacturer and Model:

1. Cla-Val 90-05 Pressure Reducing Valve with Return Flow Feature

2. Approved Equivalent

B. Valve Operation: Pressure Reducing Valve automatically reduces a higher inlet pressure to a steady lower downstream pressure, regardless of changing flow rate and/or varying inlet pressure. The valve shall maintain the downstream pressure to a pre-determined limit regardless of the upstream pressure. When downstream pressure exceeds the pressure setting on the control piloting, the main valve and pilot valve shall close drip-tight. A CDC/CSC check valve shall be included to permit return flow when the outlet pressure is greater than the inlet pressure.

C. Description:

1. Adjustment range: 20 to 200 psi
2. Body and Cover: Stainless steel; 150 pound flanges
3. Globe style
4. Disk Retainer & Diaphragm Washer: Stainless steel.
5. Trim (Disc guide, seat, and cover bearing): Stainless steel.
6. Disc: Buna N Rubber
7. Diaphragm: Nylon reinforced Buna N.
8. Stem, Nut, and Spring: Stainless steel.
9. Provide with upstream and downstream pressure gauges to visually indicate pipeline pressures.

D. Pilot System Materials:

1. Pilot Control: Stainless steel.
2. Trim: Stainless steel.
3. Rubber: Buna N Synthetic Rubber.
4. Tubing and Fittings: Stainless steel.

E. Optional Features:

1. Provide a CDC/CSC check valve to permit return flow.
2. Provide X46A Flow Clean Strainer on all piloting inlets.
3. Provide CK2 isolation valves.
4. Provide X43 "Y" strainer.
5. Provide a Pressure Gauge on both the upstream and downstream piloting.
6. Provide a Valve Position Indicator.

2.08 PRESSURE SUSTAINING VALVES

A. Approved Manufacturers and Type:

1. Model 50-90 by Cla-Val Company.
2. Approved Equivalent.

B. Construction: Control Valve shall consist of a main valve assembly and a pilot system, completely assembled and tested as a unit and ready for field installation.

C. Function: The pilot operated pressure sustaining valve shall automatically throttle to prevent incoming pressure from falling below a pre-selected minimum. Should the controlled pressure approach the set point, the valve will throttle to maintain the set point. Coordinate with the Owner/Engineer in the field to adjust the set point as needed.

D. Anticipated Operation Description: The Pressure Sustaining Valve is intended to maintain a minimum set pressure within a water storage pond. When the pond pressure meets or exceeds the minimum set point pressure, the valve shall remain open. If the pond pressure drops below the specified set point, the valve shall close to sustain upstream pressure until the pond water level is restored to its required elevation. The anticipated pressure set point is approximately 8 psi.

E. Design:

1. Globe type.
2. Connection Type: 150 Flanged.
3. Minimum pressure rating: 250 psi.
4. Port area: equal to full pipe area.
5. Main Valve:
    a. Valve body, cover, trim, diaphragm assembly, flanges, and fasteners: 316 Stainless Steel.
    b. Pressure Rating: ANSI Class 150, maximum 285 psi.
    c. End detail: Slip-on two-piece flange. Dimensions per ANSI B16.5.
    d. Disc: Viton.
    e. Diaphragm: Viton.
    f. Stem, nut, and spring: Stainless Steel.
    g. Options:
        1) Opening and closing speed controls.
        2) Provide with check valve feature to close the valve upon detection of a pressure reversal.
        3) Provide upstream and downstream pressure gauges to visually indicate pipeline pressures.
        4) Provide valve position indicator.
6. The main valve shall be serviceable in the line through a single flanged cover that provides easy access to all internal components.

F. Pilot System

1. Control piping and all associated accessories shall be Type 316 Stainless Steel, no less than 0.5-inch in diameter.
2. The pilot valve, controlling operation of the main valve, shall have a range of adjustment, be easily accessible, and arranged to allow for easy removal from the main valve while the main valve is under pressure.
3. The pilot valve, speed control valve, external strainer with blow-off, isolation valves, and all associated rigid piping and fittings shall be factory assembled and furnished with the valve. Where the valve is installed 7 feet or greater above the floor, the pilot system shall be wall mounted 4 feet above finished floor in an accessible location for operator access and rigid piped to the valve. The location of the wall mounted pilot system shall be coordinated with the Engineer.
4. Adjustment Range: 0 to 75 psi.
5. Factory setting: Contact Engineer.
6. Pilot Control: Stainless Steel.
7. Trim: Stainless Steel.
8. Tube and fittings: Stainless steel tubing and fittings.
9. Piloting shall include flow clean strainers and isolation valves at all valve body penetrations for cleaning of any debris or calcification.

2.09 DUCKBILLED CHECK VALVES

A. Approved Manufacturers and Type:

1. Red Valve Company
2. Tideflex Technologies
3. Cla-Val Company
4. Approved Manufacturer

B. Materials:

1. Valve Body shall be neoprene, EPDM, or natural rubber suitable for wastewater service, unless otherwise indicated.
2. Stainless Steel clamps, flanges, and fasteners.

C. One-piece, flexible duckbill-style check valve with no mechanical or moving parts.

D. Normally closed design that opens with forward flow and provides positive sealing under backpressure.

E. Design shall allow full port opening with minimal headloss and automatic closure without external power or controls.

F. Minimum backpressure rating: 5 psi unless otherwise shown.

G. Valve shall be drip-tight under rated backpressure.

H. Capable of passing solids without clogging.

I. Size shown on Drawings.

J. End Connection shall be flanged, slip-on, or clamp-type connection as shown on Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install valves with stems upright or horizontal, not inverted (does not apply to plug valves).

B. Install valves in the locations shown on Drawings. Verify configuration with Owner and Engineer.

C. Manual valves located higher than seven feet shall be equipped with a chainwheel operator.

D. Provide adequate structural support of installed valves as required.

E. Install valves per manufacturer's recommendations.

F. Valve tags to be installed so as not to interfere with valve operation.

3.02 PAINTING

A. All material and equipment in this section shall be factory primed. Primer shall be compatible with finish coats of paint provided under Section 09 90 00.

B. Finish painting of all materials and equipment in this Section that are not concealed shall be the responsibility of the General Contractor, and shall be as described in Section 09 90 00, unless otherwise specifically indicated.

C. The Contractor shall, however, refinish and restore to the original appearance, all equipment that has sustained damage to the manufacturer's finish or prime coats of paint or enamel.

END OF SECTION

SECTION 40 61 13
PROCESS CONTROL SYSTEM GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Basic requirements for complete instrumentation system for process control.
2. Requirement for Contractor to subcontract the Process Control System portion of the work to a “Hardware System Integrator.” See specifications contained within.
3. “Software System Integrator” services will be provided under a separate contract outside of the construction contract. See specifications contained within.
4. PLC and HMI programming and associated programming startup services are not required from the contractor as part of contractors bid. See specifications contained within.

1.02 QUALITY ASSURANCE

A. Referenced Standards:

1. The International Society of Automation (ISA):
   a. 7.0.01 - Quality Standard for Instrument Air.
   b. S5.1 - Instrumentation Symbols and Identification.
   c. S5.3 - Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems.
   d. S20 - Standard Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves.
   e. 62443-3-3 - Security for Industrial Automation and Control Systems, Part 3-3: System Security Requirements and Security Levels
2. National Electrical Manufacturers Association (NEMA):
   a. 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
3. National Fire Protection Association (NFPA):
   a. 70 - National Electrical Code (NEC).
4. Underwriters Laboratories, Inc. (UL):
   a. 913 - Standard for Safety, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.
5. National Institute of Standards and Technology (NIST)
   a. SP 800-82 - Guide to Industrial Control Systems (ICS) Security

B. Qualifications:

1. Hardware System Integrator (HSI):
    a. A single manufacturer who is skilled and experienced in the production of control systems shall furnish the automatic control system equipment. The manufacturer shall have the following experience:
        1) Have satisfactorily provided control system integration for a minimum of five projects of similar magnitude and function.
        2) Level, flow, and pressure controls.
        3) Wastewater treatment, pumping facilities, and distribution systems.
        4) Radio Telemetry systems.
    b. Certification:
        1) UL508A Certification
        2) UL698A Certification
    c. Qualification:
        1) Regularly engaged in the design and the installation of process control and instrumentation systems and their associated subsystems as they are applied to the municipal wastewater industry.
        2) Maintains a permanent, fully staffed and equipped service facility with full time employees capable of designing, documenting, fabricating, installing, calibrating, providing training services, and testing the systems specified herein.
        3) Capable of responding to on-site problems within 24 hours of notice. Provide an on-site response within 12 hours of notification starting at two months before scheduled startup to two months after startup completion.

C. Miscellaneous:

1. Comply with electrical classifications and NEMA enclosure types shown on Drawings.

1.03 DEFINITIONS

A. Calibrate: To standardize a device so that it provides a specified response to known inputs.

B. Highly Corrosive and Corrosive Areas: Rooms or areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater or chemical solutions; or chronic exposure

to corrosive, caustic or acidic agents, chemicals, chemical fumes or chemical mixtures.

C. Intrinsically Safe Circuit: A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under test conditions as prescribed in UL 913.

1.04 SYSTEM DESCRIPTION

A. Control System Requirements

1. This Specification Section provides the general requirements for the control system.
2. The control system consists of all primary elements, transmitters, switches, controllers, computers, communication devices, recorders, indicators, panels, signal converters, signal boosters, amplifiers, special power supplies, special or shielded cable, special grounding or isolation, auxiliaries, software, wiring, and other devices required to provide complete control of the plant as specified in the Contract Documents.
3. The control system shall be the result of the combined efforts of the Hardware System Integrator, Software System Integrator, and Electrical Contractor. Descriptions are provided as follows:
   a. Hardware System Integrator (HSI)
      NOTE, THE EQUIPMENT AND INSTRUMENTATION PROVIDED BY THE HARDWARE SYSTEM INTEGRATOR AS SPECIFIED HEREIN SHALL BE PROVIDED THROUGH THE DIVISION 26 ELECTRICAL CONTRACTOR .
      The Hardware System Integrator shall be responsible for the following:
      1) The design of all equipment required by these specifications and as indicated within the Engineer's drawings.

      2) Testing of all equipment required by these specifications and as indicated within the Engineer's drawings.

      3) All control panels, control panel components, network racks, network control panels, junction boxes, control stations and materials furnished in the control panels as identified by the following specifications and as indicated in the Engineer's drawings:

         Section 40 63 13 - Process Control Panels and Hardware

         Section 40 63 43 - Programmable Logic Controllers

         Section 40 66 53 - Radio and Telemetry Equipment

4) Each control panel component shall be factory mounted, wired, inspected, and factory tested as a complete system.

5) Purchasing all PLC panel materials and construction of PLC panels.

6) Provide hardware testing of all control panels, network racks, and local control stations as listed in Section 40 61 21 - Process Control System Testing

7) The Hardware System Integrator shall provide their own PLC programming software for use in testing the hardware and communications.

8) Overseeing and verifying the communications cabling, fiber optic cabling, and all communications terminations required for operation of the PLC control system including Process Equipment PLC panels supplied in other sections.

9) Provide the following primary process measurement devices / instrumentation as defined by 40 70 01 - Instrumentation General Requirements:

   Section 40 73 00 - Pressure Measurement

   Section 40 74 00 - Temperature Measurement

   The hardware system integrator shall be responsible for overseeing the installation and field calibration of all items supplied. Refer to 40 61 21 - Process Control System Testing for additional testing requirements.

10) Work with Software System Integrator and Electrical Contractor to install an Ethernet Network as shown and indicated in the Engineering's drawings.

11) Overseeing and verifying the field connections and functionality of all sensors and devices provided in other sections of the specifications that are connected to the PLC system.

12) Assisting the Software System Integrator in the start-up and field verification of the various control loops in the system.

13) Generate the Hardware and Software O&M Manuals regarding all equipment supplied for the PLC control system. See specification section 01 78 23 - Operation and Maintenance Data.

14) The Hardware System Integrator shall **NOT** be responsible for the following:

a) PLC control panels supplied by process equipment vendors.

b. Acceptable Hardware System Integrators are:

1) Integrated Process Solutions (IPS)

a) Location: Fosston, MN
b) Phone: (218) 435-1703

2) Wunderlich-Malec

a) Location: Minnetonka, MN
b) Phone: (952) 933-3222

3) Primex

a) Location: Plymouth, MN
b) Phone: (763) 559-0568

4) Or “Approved Equal”

c. Software System Integrator (SSI) - The Software System Integrator shall be under a separate contract outside of the construction contract to provide programming and start-up services for the Programmable Logic Controllers (PLCs), Operator Interfaces (OITs), Human Machine Interfaces (HMIs), Network System Configuration, Server Setup and Configuration, and Computer Workstation Setup and Configuration. This does not include PLC and/or OIT programming by OEM vendors.

1) The Software System Integrator shall provide technical assistance to the Hardware System Integrator during the PLC panel hardware design.

2) Coordinate with Process Equipment PLC panels supplied by equipment vendors on the project.

3) Define and refine the control loop requirements with the Engineer.

4) Develop and test PLC programs for the PLC Control System.

5) Develop HMI software interface screens and reports.

6) Work with the Hardware System Integrator in the start-up phase for field verification of all control loops in the system. This shall exclude OEM based control loops.

7) Generate the Software O&M Manuals for the HMI system

8) Software System Integrator shall coordinate data communication between all OEM vendors.

d. Electrical Contractor — The Electrical Contractor shall provide for the installation and wiring of the PLC Control System. All of the control wiring, signal wiring, and communication wiring and terminations will be provided by the Electrical Contractor.

1) Work with Hardware System Integrator to install an Ethernet Network as shown and indicated in the Engineering's drawings.

2) Electrical Contractor shall be responsible for providing and installing all conduit and wire as shown on the Electrical Instrumentation and Control One Line Diagram series.

3) It shall be the responsibility of the Electrical Contractor to provide a complete, fully operating and acceptable system. Drawings and Specification are intended to describe a complete installation for the purpose specified and to detail the scope of work for the Contractor.

4) The Electrical Contractor shall be responsible for all detail that may be necessary to properly provide, and place in operation, the complete installation. The Contractor shall assume full responsibility for additional cost that may result from unauthorized deviation from the project documents.

e. The Hardware System Integrator, Software System Integrator, and Electrical Contractor shall conduct a minimum of one meeting in person with the Engineer prior to the start of construction to go through the above responsibilities and submittal process for the project.

1.05 APPROVED EQUAL(S)

A. Hardware System Integrator

1. For full consideration of “Approved Equal” hardware system integrators, additional information must be provided no later than fourteen days prior to bid opening. The decision will be based on a pass/fail rating system and subjective to additional investigation by the Owner or Engineer. Additional information to be provided shall include the following:
2. The hardware system integrator shall have an active $1,000,000 professional liability insurance policy.
3. To demonstrate financial stability, the hardware system integrator has completed a minimum of four past projects, each with an individual contract cost in excess of $1,000,000.
4. Submit a financial prospectus indicative of the corporation's financial state. This prospectus shall also include:

a. A letter from a financial institution indicating a current line of credit and bonding limit which can be applied to this Project.
b. Latest annual report or reviewed financial statement.

5. The financial condition of the firm cannot be such that its financial ability to complete the Project is, in the opinion of the Owner, in doubt.
6. The hardware system integrator shall have in-house capability to handle complete system engineering, UL listed panel fabrication, instrument supply and calibration, commissioning, testing, and troubleshooting of the process control and instrumentation system.
7. The hardware system integrator shall be a firm specializing in the integration of control systems with documented experience in the detailed design, construction, configuration, and maintenance of PLC based control systems and variable frequency drive systems for the wastewater utility market.
8. Provide documentation to show the ability to complete NEMA Class IIS, Type B wiring diagrams for a Motor Control Center.
9. Provide a list of at least three successfully completed projects for a wastewater system of similar scope and complexity in which the proposing firm used components the same as those intended for use on this Project. In addition, provide the following information for each project:
    a. Name of plant or system owner, contact name, and current telephone number. Design engineer's name, address, and telephone number.
    b. Manufacturer and model number(s) of the PLC based control system and the computer-based PCS system used for both hardware and software.
    c. Brief description of the system.
    d. Contracted cost of the system, including change orders for the completed projects.
    e. Duration of the project and date of completion.
10. Provide a clear description of the proposed (minimum) scope of supply for the proposed hardware system integrator. This scope description shall be binding and shall be considered the minimum scope of work for the proposing firm. The intent is to verify that proposing firms can and will perform the complete, minimum scope described above.
11. It is the responsibility of the submitting hardware system integrator to deliver sufficient information of each of the previously listed items to document compliance with the minimum requirements. Failure to submit all requested information shall result in disqualification. If it is discovered at any time that any significant information submitted is incorrect, substantially misleading, or fraudulent, the submitting firm shall be subject to immediate disqualification from participation in the Project.

PART 2 PRODUCTS

2.01 NEMA TYPE REQUIREMENTS

A. Provide enclosures/housing for control system components in accordance with the area designations provided on the Drawings.

1. Areas designated as wet: NEMA Type 4.
2. Areas designated as wet and/or corrosive: NEMA Type 4X.
3. Either architecturally or non-architecturally finished areas designated as dry, noncorrosive, and nonhazardous: NEMA Type 12.
4. Areas designated to be subject to temporary submersion: NEMA 6P.

2.02 PERFORMANCE AND DESIGN REQUIREMENTS

A. Unless stated otherwise, system operating criteria are as follows:

1. Stability: After controls have taken corrective action, as result of a change in the controlled variable or a change in setpoint, oscillation of final control element shall not exceed two cycles per minute or a magnitude of movement of 0.5% full travel.
2. Response: Any change in setpoint or change in controlled variable shall produce a corresponding corrective change in position of final control element and become stabilized within 30 seconds.
3. Agreement: Setpoint indication of controlled variable and measured indication of controlled variable shall agree within 3% of full scale over a 6:1 operating range.
4. Repeatability: For any repeated magnitude of control signal, from either an increasing or decreasing direction, the final control element shall take a repeated position within 0.5 % of full travel regardless of force required to position final element.
5. Sensitivity: Controls shall respond to setpoint deviations and measured variable deviations within 1.0% of full scale.
6. Performance: All instruments and control devices shall perform in accordance with manufacturer's specifications.

2.03 ACCESSORIES

A. Provide identification devices for instrumentation system components in accordance with Specification Section 26 05 53 - Identification for Electrical Systems.

B. Provide corrosion resistant spacers to maintain 1/4 IN separation between equipment and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas such as Clarifiers, Digesters, Reservoirs, etc.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Maintain accurate daily log of all startup activities, calibration functions, and final setpoint adjustments.

B. Instrumentation Calibration:

1. Verify and document that all instruments and control devices are calibrated to provide the performance required by the Contract Documents.
   a. Utilize the Instrument Certification Sheet located at the end of this Specification Section (or Engineer approved equivalent) to document on-site calibration checks.
2. Factory furnished calibration certifications are acceptable for the following:
   a. Flow meters.
   b. Pressure sensors utilized with annular sleeve.
   c. Temperature sensors.
3. On-site calibration verification is required for all other instruments, including “smart” transmitters that have been factory calibrated.
   a. Provide calibration checks at 0 PCT, 25 PCT, 50 PCT, 75 PCT and 100 PCT of span for pressure transmitters and gages.
      1) Check for both increasing and decreasing input signals to detect hysteresis.
   b. In addition to factory calibration certification, temperature sensors and gages shall be checked at a single point for conformance to required accuracy.
   c. Level transducers/transmitters shall be checked at two points in addition to zero.
   d. Analytical sensors shall be calibrated in accordance with manufacturer’s recommendations.
   e. Check operation of all switches to verify actuation occurs in accordance with manufacturer’s specified accuracy.
   f. Replace any instrument which cannot be properly adjusted.
   g. Stroke pneumatic control valves with clean dry air to verify control action, positioner settings, and solenoid functions.
4. Calibration equipment shall be certified by an independent agency with traceability to NIST.
   a. Certification shall be up-to-date.
   b. Use of equipment with expired certifications shall not be permitted.
5. Calibration equipment shall be at least three times more accurate as the device being calibrated.

C. Loop Check-Out Requirements are as Follows:

1. Work closely with the Owner to check control signal generation, transmission, reception and response for all control loops under simulated operating conditions by imposing a signal on the loop at the instrument connections. Loop check-out work shall verify proper operation of the installed equipment and the Owner's PLC and HMI programming.
    a. Use actual signals where available.
    b. Closely observe controllers, indicators, transmitters, HMI displays, recorders, alarm and trip units, remote setpoints, ratio systems, and other control components.
        1) Verify that readings at all loop components are in agreement.
        2) Make corrections as required.
            a) Following any corrections, retest the loop as before.

END OF SECTION

SECTION 40 61 21
PROCESS CONTROL SYSTEM TESTING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for testing of the Process Control System (PCS) hardware and software prior to shipment to the site for installation.
   a. Inspection.
      1) System hardware operational testing.
      2) System software demonstration.
   b. Test records.
2. Requirements for field testing of the PCS hardware and software.
   a. Process Control System checkout.
   b. Instrument calibration.
   c. Loop testing/checkout.
   d. Integrated Site Acceptance Test (SAT).
   e. Operational Readiness Demonstration (ORD).

1.02 SUBMITTALS

A. Submit in accordance with Specification Section 01 33 00 - Submittal Procedures including the following:

B. Submit factory acceptance test (FAT) procedures not less than 15 calendar days prior to the scheduled start of the FAT. Include the following:

1. Modular test plans and procedures to allow individual test segments to be repeated if necessary.
2. Description of individual test segments and steps comprising each segment, particularly the methods and processes to be followed.
3. Procedures for monitoring, correcting, and retesting variances.
4. Procedures for controlling and documenting all changes made to the hardware/software after the start of testing.
5. Descriptions of test equipment.
6. Expected results for each segment, including pass/fail criteria.
7. Documentation record forms to be used to certify results of factory testing.
8. Block diagrams of the hardware test configuration, such as PLC external communication links, and any test or simulation hardware and software.

C. Post factory acceptance test:

1. Final documentation certifying that all Factory tests have passed with satisfactory results.

D. Field Testing Shop Drawings:

1. Site Acceptance Test (SAT) Plan.
   a. Divide into separate sections based on process systems.
   b. Each section shall include a sequential step-by-step checkout plan.
2. Typical Loop Checkout Sheets, if other than the form included within contract documents.
3. Typical Instrument Certification Sheets, if other than the form included within contract documents.
4. Typical Final Control Element Certification Sheets, if other than the form included within contract documents.

E. Contract Closeout Information:

1. Site Acceptance Test (SAT) Report.
2. Completed Loop Checkout Sheets.
3. Completed Instrument Certification Sheets.
4. Completed Final Control Element Certification Sheets.
5. All system startup and checkout records, test records, recommendations and information furnished by Manufacturer's representatives during testing and startup, and amended documentation specified herein.

PART 2 PRODUCTS

2.01 FACTORY ACCEPTANCE TESTING (FAT) GENERAL:

A. Utilize software-based process control simulation and hardware-based I/O simulation panel when conducting the full system test. Software based process simulation shall provide a real time, virtual environment that interfaces with the PLC system applications software and programming to mimic the behavior of the real process equipment and systems that are monitored and controlled by the PLC system, including the capability to force individual or groups of PLC system I/O.

B. Demonstration of communication between processors and remote I/O racks shall be included in the Test Procedure, where applicable. Test shall include demonstration that communication performance (speed, error rates, failure and recovery) conforms to specified requirements.

C. Any tested segment or function that does not pass in accordance with agreed upon pass/fail criteria shall be retested until the segment or function passes the test.

1. Pass/fail criteria shall be in accordance with criteria set forth in an approved shop drawing submittal.
2. The Contractor shall bear all additional travel/accommodation expenses incurred by the Owner due to extension of test dates for retesting of failed segments or functions.

D. Notify the Engineer in writing a minimum of 15 calendar days prior to the Factory Tests.

1. Engineer has the option to witness all required tests.

E. Testing Documentation

1. Make following documentation available at test site during the tests:
   a. Contract Documents.
   b. Factory Demonstration Testing procedures.
   c. List of equipment to be tested including make, model, and serial number.
   d. Shop Drawing submittal data for equipment being tested.
2. Engineer reserves the right to review all documentation at any time during testing.

2.02 FAT INSPECTION

A. The FAT Inspection shall be performed by the Hardware System Integrator.

B. Inspect all panels, operator interface terminals and cabinets prior to conducting the FAT to verify quality of workmanship and conformance to the Contract Documents and approved Shop Drawings. Completed inspection forms shall be available for review at time of FAT. Inspection shall include, but not be limited to, the following:

1. Nameplates, warning labels, and tags including correct spelling, color and size of labeling and characters and methods of attachment.
2. Enclosure surfaces flatness, finish, and color.
3. Proper operation of doors, catches, and locks.
4. Wire and cable type, sizes, tagging, color coding and tag placement in readily viewable position/orientation.
5. Wiring runs across hinges properly installed.
6. Proper wiring routing, layout, practices, and grounding.
7. All electrical circuits checked for continuity.
8. Terminal block contact ratings and numbers.
9. Fuses and circuit breakers are correct size and type.
10. Terminal block, fuse, breaker, and other required installed spares.
11. General arrangement and space allocation, including spare usable space in panel and on panel door.

12. PLC equipment (chassis, power supply, power conditioners, processor, adapters, I/O and specialty modules, installed spares, spare usable space) is appropriate.
13. Proper placement, isolation, and labeling of intrinsic safety devices and associated wiring.
14. Equipment and devices are properly installed and secured to subpanels and doors using appropriate methods and in appropriate orientation.
15. Fans, blowers, heaters, air-conditioning units, and other environmental controls are operational, unobstructed, and installed with sufficient clearances recommended by component manufacturers.

2.03 FAT - SYSTEM HARDWARE OPERATIONAL TESTING

A. The System Hardware Operational Testing shall be performed by the Hardware System Integrator.

B. Assemble and interconnect the entire PLC system as a network that mimics the network that is designed to be installed at the Plant site.

1. As a minimum, the test shall include the following major components:
    a. All control panels that interface with the control network that are provided by the Hardware System Integrator, including local control panels, remote control panels, hardwired/relay logic and PLC based panels.
    b. Remote I/O Panels.
    c. Human Machine Interface (HMI) system.
    d. Ethernet Networks.
    e. Panel Mounted Uninterruptible Power Supplies.
    f. Network switches, Routers, Firewalls.
    g. Other network equipment and appurtenances.

C. Packaged systems not present at FAT shall be simulated; communications interfaces shall be simulated to/from vendor confirmed interface registers.

D. All system hardware components and equipment shall be tested to verify proper operation as standalone units. Tests shall include, but not be limited to, the following:

1. AC/DC power checks.
2. Power fail/restart tests.
3. Verification of UPS power to required components.
4. Diagnostics checks.
5. Verification that all equipment is functioning properly.
6. All electrical circuits energized simultaneously and continuously for 48 HRS without failures.
7. All alarm circuits connected to simulated alarm contacts to verify operation.

8. All interlock and shutdown circuits checked for operability and proper function by means of simulated contact.
9. All hardwired input/output devices and components, and all network connected I/O shall be tested to verify operability and basic calibration.
10. Simulate operation of electronic control and receiving instruments and circuits.
11. Any other test required to place the PCS equipment in an operating state.
12. Verify all redundant components fail-over hands-free without interruption of control process.
13. Verify all servers and networking equipment are in an operating state with no unresolved errors in error logs.
14. Verify that all components are integrated and communicating for full simulation test including any simulation software if applicable.
15. Compliance with Contract Documents.

E. Develop and execute device failure conditions including PLC failure, HMI Workstation failure, peripheral failures, server failure, etc. Special attention shall be given to creating failures in the middle of operator sequences and control actions such as:

1. Failure of a major communications component.
2. Incorrect operator entry in the middle of a multi-step action.
3. HMI Workstation failure in the middle of a control action.
4. OIT failure in the middle of a control action.
5. Demonstration of all redundant functions and components.
6. Demonstration of all required alarm processing functionality, including audible annunciation.

2.04 FAT - SYSTEM SOFTWARE DEMONSTRATION

A. The System Software Demonstration shall be performed by the Software System Integrator as a part of a separate Contract with Owner, see Section 40 61 13 - Process Control System General Requirements.

B. Demonstrate all system software during the FAT (e.g. process monitoring and control, HMI, OIT, historian, alarming, simulation, modeling, utility and security programs) incorporated into the system to implement the various functions and capabilities specified. Demonstrations shall include:

1. All required historical data capture, storage, retrieval and reporting functions.
2. All required data management, logging, and trending functions.
3. All required network, communication, and interface functions.
4. All required device control functions.
5. All required database management functionality.
6. All required software support utilities.

7. All Control System diagnostics, both on-line and off-line.
8. Correct operation of computations and calculated quantities including totalized values.
9. Proper operation of all changes to the originally specified Control System that have been negotiated and approved during the implementation period.

C. Demonstrate the proper operation, configuration and programming of all software based on simulation of all the analog inputs/outputs and all of the discrete inputs and outputs, as indicated on the I/O list. In addition to testing allocated I/O, all spare I/O points shall also be simulated and tested to the degree possible. Demonstration shall show that the monitoring and control software and configuration and programming associated with the input/output points (hardwired and network connected) performs as intended.

1. PLC I/O testing shall include, as a minimum, the following:
   a. Simulate a field digital input for each PLC input point at the terminal strip of the control panel and verify PLC response.
   b. Simulate a field analog input for each PLC analog input point at the terminal strip of the control panel and verify PLC response.
   c. Force an output for each PLC digital output point and verify the signal presence at the terminal strip in the control panel.
   d. Simulate an analog output for each PLC analog output point and verify signal presence at the terminal strip in the control panel.

2.05 FAT TEST RECORDS:

A. Maintain records of all factory test results. As a minimum, include the following items:

1. Name of test procedure.
2. Date of the test.
3. Test results for each test segment including a passed/failed indication.
4. Signatures of individual(s) performing the test and witnesses thereof.

PART 3 EXECUTION

3.01 GENERAL

A. Maintain accurate daily log of all testing activities, calibration functions, and final set point adjustments.

B. All testing may be witnessed by the Owner or Engineer.

3.02 INSTALLATION AND CHECKOUT

A. Provide the following (after successful completion of the Factory Acceptance Test):

1. Check and approve the installation of all Process Control System (PCS) components (including but not limited to control panels, motor control centers, standalone VFDs/motor starters, field instruments, networking equipment and racks, patch panels and all cable and wiring interconnects between various equipment, panels and devices) prior to placing the various processes and equipment into operation. As a minimum, include:
    a. Verification and documentation that all field instruments and pneumatic signals function properly and are properly calibrated.
    b. Testing of all final control actions.

B. Provide services of authorized manufacturer's representatives to check and verify the correctness of the installation and operation of equipment.

3.03 PRE-DEMONSTRATION PERIOD TESTING

A. Instrumentation Calibration:

1. Verify and document that all instruments and control devices are calibrated to provide the performance required by the Contract Documents.
2. Factory furnished calibration certifications are acceptable for the following:
    a. Flow meters.
    b. Pressure sensors utilized with annular sleeve.
    c. Temperature sensors.
3. On-site calibration verification is required for all other instruments, including "smart" transmitters that have been factory calibrated.
    a. Provide calibration checks at 0 %, 25 %, 50 %, 75 % and 100 % of span for pressure transmitters and gages.
        1) Check for both increasing and decreasing input signals to detect hysteresis.
    b. In addition to factory calibration certification, temperature sensors and gages shall be checked at a single point for conformance to required accuracy.
    c. Level transducers/transmitters shall be checked at two points in addition to zero.
    d. Analytical sensors shall be calibrated in accordance with manufacturer's recommendations.
    e. Check operation of all switches to verify actuation occurs in accordance with manufacturer's specified accuracy.
    f. Replace any instrument which cannot be properly adjusted.
4. Mark range, date, set point and calibrator's initials on each instrument by means of blue or black ink on a waterproof tag affixed to the instrument.
5. Calibration equipment shall be certified by an independent agency with traceability to NIST.
    a. Certification shall be up-to-date.
    b. Use of equipment with expired certifications shall not be permitted.

6. Calibration equipment shall be at least three times more accurate as the device being calibrated.

B. Loop Testing:

1. Utilize the Loop Check-Out Sheet located in Section 40 61 21.1 - Loop Check-Out (or Engineer approved equivalent) to document on-site calibration checks.
   a. Utilize separate loop checkout form for each loop.
2. Minimum loop checkout requirements:
   a. Use actual signals where available.
   b. Check control signal generation, transmission, reception and response for all inputs and outputs for all control loops under simulated operating conditions by imposing a signal on the loop at the instrument connections.
   c. Closely observe controllers, indicators, transmitters, HMI displays, OIT displays, recorders, alarm and trip units, remote set points, ratio systems, and other components.
      1) Verify that readings at all loop components are in agreement.
      2) Make corrections as required.
      3) Following any corrections, retest the loop.
   d. Stroke all control valves, cylinders, drives and connecting linkages from the local control station and from the control room operator interface.
   e. Check all interlocks for proper functionality.
   f. Record all set point and calibration changes on all affected Contract Documents and turn over to Owner.

C. Integrated Site Acceptance Test (SAT):

1. Following the testing of each individual loop, perform an integrated Site Acceptance Test (SAT) to verify that all equipment and programmed software are operating as described in the Contract Documents and equipment manufacturers recommendations. Checks to include:
   a. The intended monitoring and control functions of the PCS; including all vendor furnished equipment packaged systems, communications, operator interfaces, statuses, alarms, trends and recording of historical tags.
   b. Integrated testing on a system by system basis as described in the submitted Site Acceptance Test (SAT) plan sequential step-by-step checkout plan.
      1) Documentation with initials of the individuals who perform each test.
2. Provide minimum fifteen (15) day notice to the Owner prior to commencing the SAT.

3. Promptly address and re-test any malfunctions, issues and incompletions arising during the SAT.

D. At the successful conclusion of all testing specified in this article, submit an instrumentation installation report, summarizing results found.

3.04 DEMONSTRATION PERIOD

A. Demonstrate the functional integrity of the Process Control System for the entire facility as evidence of Substantial Completion.

END OF SECTION

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LOOP CHECK-OUT SHEET

Project Name:	Owner's Project No.:	Page of
Project Owner:	Regulatory Agency Project No.:	
AE2S Project No.:	Date:	

LEAK AND TERMINATION/CONTINUITY CHECKS

DESCRIPTION	FIELD					CONTROL CAB	
	LEAK CHECK(1)			TERM/CONT CHECK(2)		TERM/CONT CHECK(2)	
	Device Tag No.	Process Connection	Signal Tube	Device Tag No.	Termination Identification	Device Tag No.	Termination Identification

1. Leak check for pneumatic signal tubing to be per ISA-PR7.1.
2. Termination/continuity check at terminated equipment for: (a) correct polarity, (b) appropriate signal generation, transmission and reception, and (c) correct shield & ground terminations.

OPERATOR INTERFACE CHECK-OUT

MONITORING POINTS OBSERVED

PARAMETER TYPE	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.
PROCESS VAR						
EQUIP STATUS						
ALARM POINT						

OPERATOR CONTROL FUNCTION CHECKED

FUNCTION TYPE	TAG NO.	LOCATION	TAG NO.	LOCATION	TAG NO.	LOCATION

FINAL CONFIGURED SETTINGS

TAG NO.	SWITCH & ALARM SP	CONTROLLERS			
		Gain	Reset, rpm	Deriv. (rate), min	PV Set Point

Describe all interlocks checked, equipment started/stopped, valves/operators stroked. Describe modes of operation checked, and location of operator interface (local/remote).

_____

_____

_____

_____

_____

_____

I certify that the control loop referenced on this page has been completely checked and functions in accordance with applicable drawings and specifications.

Certified by:_____

Date:_____

(Work Performed By)

SECTION 40 63 13
PROCESS CONTROL PANELS AND HARDWARE

PART 1 GENERAL

1.01 SUMMARY

NOTE, THE HARDWARE SYSTEM INTEGRATOR AS SPECIFIED HEREIN SHALL PROVIDE THE EQUIPMENT LISTED IN THE 'PART 2' SECTIONS BELOW THROUGH THE DIVISION 26 ELECTRICAL CONTRACTOR.

A. Description

1. Complete PLC based control system with Supervisory Control and Data Acquisition (SCADA) functions.
2. This section is intended to cover all work necessary for the procurement of the wastewater system facility process control and instrumentation equipment. This includes all specified and required equipment installed and place into acceptable operation as herein described.

B. Responsibility and Coordination

1. It shall be the responsibility of the Contractor to provide a complete, fully operating and acceptable system. Drawings and Specification are intended to describe a complete installation for the purpose specified and to detail the scope of work for the Contractor.
2. The Contractor shall be responsible for all detail that may be necessary to properly provide, and place in operation, the complete installation. The Contractor shall assume full responsibility for additional cost that may result from unauthorized deviation from the project documents.

C. Approved Equal(s)

1. Hardware or Equipment
   a. The naming of a manufacturer of equipment in this Specification is not intended to eliminate competition or prohibit qualified manufacturers from offering equipment. Rather, the intent is to establish a minimum standard of quality, and to indicate a principle of operation desired for this project. Other manufacturers of similar system controls are encouraged to submit for prior approval.
   b. No hardware system integrator, or their agent or supplier, shall submit for approval without the full understanding on the part of that the hardware system integrator, Contractor, agent or supplier, may be rejected, and that the Engineer will use his own judgment; and that his decision is final. In the event of adverse decision, no claim of any sort or kind shall be made against the Owner or Engineer.

D. Testing Agency Certification

1. All new panels and control system junction boxes furnished under this Section shall be constructed in accordance with Underwriter's Laboratories (UL) Standard 508 - "Industrial Control Equipment" or Underwriter's Laboratories (UL) Standard 698 - "Industrial Control Equipment for Use in Hazardous (Classified) Locations".
2. Each panel shall be shop-inspected by UL or constructed in a UL-recognized facility. Each completed panel shall bear a serialized UL label indicating acceptance under Standard UL 508A or UL 698A.

E. Delivery, Storage, and Handling

1. Do not remove shipping blocks, plugs, caps, and desiccant dryers installed to protect the instrumentation during shipment until the instruments are installed and permanent connections are made.

F. Work Items Specified Under This Section

1. General Control System Scope.
2. System Control Panels.
3. Control Panel Components.
4. Hardware System Integrator Required Services.

1.02 SUBMITTALS

A. Submit shop drawings in accordance with Specification Section 01 33 00 - Submittal Procedures. The following information shall be included within each submittal as required by the type of equipment or instrumentation that is being submitted on by the system manufacturer.The following information is not required to be in this order. All submittals are required to have the following information if applicable or will be subject to rejection.

1. PDF Bookmarks for Ease of Submittal Navigation
2. Equipment Cut Sheets
    a. Cut sheets detailing all relevant information shall be provided for all equipment/components that will be used.
        1) Physical limitations of components including high and low temperature limits shall be identified.

    b. All cut sheets shall be clearly highlighted indicating specific part number buildout for all equipment and components.
3. Bill of Materials
    a. Bill of materials shall be provided for each enclosure provided detailing equipment and components being utilized.
4. Power Calculations
    a. Power calculations shall be provided for the following if they are present:

1) Control Panel incoming power per phase

2) 24VDC Power Supply

3) UPS

4) MCC CPT

5. Heat Calculations
   a. Heat calculations shall be provided for the following if they are present:
      1) Outdoor Enclosures with Sensitive Electronics

      2) Indoor Enclosures with Heat Emitting Equipment in or Near the Enclosure

6. I/O Schedules
   a. An I/O schedule shall be provided for each control panel.
7. Control Panel, Junction Box, Network Rack, and MCC Bucket Details and Layouts
   a. NEMA ratings of all equipment shall be clearly identified.
   b. Identify electrical power requirements of each assembled
   c. Provide detailed layouts of all equipment. Identify overall dimensions and provide estimated weight of assembled equipment.
   d. Nameplate layout drawings shall be provided.
8. Loop Control Drawings
   a. Loop control drawings shall be provided that detail all electrical connections to/from and inside the CP, NWP, or MCC. This includes but is not limited to the following:
      1) Tag Names

      2) Terminal Block Numbering

      3) Conductor Type

      4) Conductor Quantity

      5) Conductor Jacket Color

      6) Hard Wired Logic (Relays, Switches, etc…)

9. Provide drawings and layouts in both PDF and AutoCAD electronic formats.

1.03 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's data in accordance with Specification Section 01 78 23 - Operation and Maintenance Data.

PART 2 PRODUCTS

2.01 GENERAL

A. The system controls, alarms, and telemetry shall be constructed as shown on drawings and herein described.

2.02 PROCESS CONTROL PANEL

A. Control Panel Enclosures

1. The control panels shall include the following
   a. Enclosure with back panel and mounting provisions.
   b. Enclosures shall be stainless steel type 304 for general use. Type 316 stainless steel shall be utilized in caustic environments.
   c. Interior light activated by door switch provided for each door of the enclosure.
   d. Transient and surge suppression for power and control input/output.
   e. Linear regulated DC power supplies. Power supplies shall be UL listed for use in type 508A or 698A Industrial Control Panels as required: AC power input fusing AC power transient protection current Limiting AC “power on” indication.
   f. Separate terminal blocks for inputs and outputs.
   g. GFCI receptacle outlet (120V).
   h. Programmable logic controller with I/O modules as required.
   i. Lockable door handle.
   j. Inner door pocket for storing wiring diagrams.
   k. 18”x18” fold up programming shelf on all free standing enclosures.
   l. Refer to the E drawings for enclosures that shall be insulated with 1/2" Insulation on all sides. All outdoor enclosures shall include insulation unless noted.
   m. Refer to the E drawings for enclosures that shall have sun shields. Any sun shield worth consideration shall be equal to SCE SUN-SHIELD. Coordinate final requirements with enclosure manufacturer.
      1) Provide shield on top, front and all sides.
   n. See E drawings for door mounted devices and associated labeling.
   o. Enclosure size shall be selected based off of equipment as shown in the E Drawings and within this specification. Any enclosure sizing shown within the drawings are to be used as a minimum size. It is up to the hardware system integrator to increase the size of any enclosure to ensure all equipment fits with reasonable space remaining.
2. Enclosure Schedule:
   a. Control Panel Enclosure(s) shall be furnished and installed for the following application(s):
      1) NEMA Type 4X Stainless Steel

a) Wall Mounted
(1) GC-CP1

3. Manufacturer/Model:
   a. Hoffman
   b. SCE
   c. Prior Approved Equal

B. Panel Heater

1. Manufactured unit with aluminum housing and integral thermostat and 0°F to 100°F adjustable range.
2. Provide quantity and size as required to meet temperature requirements specified.
3. UL labeled
4. Panel Heater Schedule:
   a. Shall be furnished and installed in the following application(s):
      1) GC-CP1

   b. Refer to the Control Panel Drawings and Typical Wiring Schematics within the Engineers Drawings for quantity and requirements.
5. Manufacturer/Model:
   a. Hoffman DAH Series
   b. Prior Approved Equal

2.03 PROCESS CONTROL PANEL COMPONENTS

A. Miniature Circuit Breakers

1. General Specifications:
   a. UL489 Branch Protection
   b. Trip Curves
      1) C Trip Curve: Low/Medium Inrush Applications

      2) D Trip Curve: High Inrush Applications (Motors)

   c. SCCR (Minimum): 10kAIC
   d. Breaker Status Indicator
   e. Utilize 1-pole, 2-pole, and 3-pole breakers within the control panels as indicated below and as shown in the typical wiring schematics found within the E Drawings.
   f. Shall be furnished and installed for the following applications:
      1) 1-Pole

         a) Incoming Power Feed
         b) Internal Panel Components
            (1) 24VDC Power Supply (120Vac Input)
            (2) 24VDC Power Supply (24Vdc Output)
            (3) Programmable Logic Controller (PLC)
            (4) Ethernet Switch

(5) Modems / Radios

g. Manufacturer/Model:

1) Allen Bradley

2) Phoenix Contact TMC 8 Series

3) Eaton FAZ

4) SquareD Multi 9

5) Prior Approved Equal

B. Fused Terminals

1. General Specifications:

a. DIN rail mounted, touch safe, modular type
b. Minimum Rated Voltage: 250V RMS
c. Rated Current: As required per application
d. Physical Dimensions: ¼" x 1 ¼" Standard Fuses
e. Blown fuse indicator light
f. Manufacturer/Model:

1) Allen Bradley

2) Phoenix Contact UT 6-HESILA

3) Weidmuller

4) Prior Approved Equal

C. Terminal Blocks

1. General Specifications:

a. DIN rail mounted, touch safe, modular type.
b. Minimum Rated Voltage: 600V RMS
c. Minimum Rated Current: 24 amps or higher as required per application
d. Connector metal body material: Copper alloy, min 85% copper with nickel or tin plating
e. Terminal screw material: Bronze with tin plating
f. Terminal Block Characteristics:

1) It shall terminate wires without additional preparation: i.e. tinning of wire ends, application of ferrules, etc.

2) All shall have a nominal conductor termination acceptance of 4mm^2. The one exception is that 2.5mm^2 shall be allowed for use within the MCC control circuitry as long as the required conductor and ampacity ratings are met.

3) The insulation housing shall have primary entry funnels to facilitate insertion of wires.

4) The insulation housing shall prevent stray strands from shorting to adjacent terminal blocks.

5) Terminal screws shall be captive in the metal body or via the insulation housing.

6) Once tightened the terminal screws shall be locked in place to prevent loosening due to shock and vibration.

7) The terminal block shall be useable with accessories such as center or insertion bridges, test sockets, separating plates, end covers, etc. The accessories used shall also be touch safe.

8) For wire identification, the terminal block shall provide space for marking with pre-marked labels. Handwritten labels shall not be allowed.

g. Manufacturer/Model:
1) Allen Bradley 1492-J4

2) Phoenix Contact UT 4

3) Weidmuller WDU 4

4) ABB

5) Prior Approved Equal

6) No Exceptions

D. Control Relays

1. General Specifications:
a. Blade plug-in type with dust cover and socket.
b. Coil (Continuous Operation):
1) Voltage (Unless Noted Otherwise): 120VAC ±10%

c. Contacts:
1) DPDT Minimum

2) Voltage: 240VAC

3) Current: 10A

a) Lower current rated contacts shall be allowed as long as the circuit passing through the contacts has adequate overcurrent protection.
d. Operating Time:
1) Energization (Nominal): 35 milliseconds

2) De-energization (Nominal): 100 milliseconds

e. Mechanical Life: 10^6 operations
f. Operating Temperature: 0°C to 70°C
g. Indicating LED or Flag
h. Relay clip shall be provided and installed for all control relays.

2. Spares:
   a. 10%, Minimum of Two (2) Plug-In Type Relay of each type used.
3. Manufacturer/Model:
   a. Allen-Bradley
   b. Phoenix Contact RIF-4-RSC-LV-120AC/3x21
   c. Idec
   d. Prior Approved Equal

E. Surge Suppressor

1. Incoming Single or 3-Phase Power
   a. General Specifications:
      1) Installed in Control Panels supplied with 480VAC 3 Phase power.

      2) Power leads shall be as short as possible to the incoming service lines.

   b. Surge Suppressor Schedule:
      1) Shall be furnished and installed for the following applications:

         a) GC-CP1
2. 120VAC Control Power
   a. General Specifications:
      1) 120 VAC In-Line Device

      2) Max Continuous Voltage: 150 V

      3) Max Continuous Current: 25 A

      4) Measured Limiting Voltage: 760 V

      5) Nominal Discharge Current: 3 kA

      6) Response Time: < 25ns

      7) Connection Type: Screw

      8) Mounting: DIN Rail

      9) Style: Plug w/ Base

      10) Dry Contact Status Indicator

   b. Surge Suppressor Schedule:

1) Shall be furnished and installed for the following applications:

a) On any control panel being supplied with 120VAC as power.

c. Manufacturer/Model:

1) Phoenix Contact - 2910356

2) Citel DS72US-120S/G

3) Critec Equal

4) Prior Approved Equal

F. DC Power Supply / UPS

1. Linear regulated DC power supplies.
2. Power supplies shall be U.L. listed for the use in type 508 or 698 Industrial Control Panels as required and abide to the following requirements:
   a. 120 VAC power input.
   b. Fusing (circuit protection) on AC power.
   c. Transient protection.
   d. Current Limiting.
   e. AC “power on” indication.
   f. DIN rail mountable.
   g. Integrated UPS
3. Power supplies shall be sized appropriately to handle the full load connected to them.
   a. Provide an additional 50% spare capacity.
   b. Power calculations showing the required load with additional spare capacity shall be provided during the submittal phase.
4. Power Supply Manufacturer/Model:
   a. Phoenix Contact
      1) TRIO3-UPS Series (24VDC/10A)

   b. Prior Approved Equal
5. UPS Battery Manufacturer/Model
   a. Phoenix Contact
      1) TRIO-BAT 24DC 7AH

   b. Prior Approved Equal

G. Programmable Logic Controllers (PLC)

1. See 40 63 43 - Programmable Logic Controllers.

H. Unmanaged Ethernet Switches

1. General Specifications:
   a. Performance:

1) Unmanaged

2) Store & Forward wire speed switching

3) Automatic address learning, aging and migration.

b. Power Input:
1) Input Voltage: 10-35VDC

2) Redundant input terminals

c. Environmental Conditions:
1) Operating Temperature: 0°C to 60°C

2) Storage Temperature: -40°C to 85°C

3) Humidity (non-condensing): 5% to 95% RH

d. Mounting: Din Rail

2. Unmanaged Ethernet Switch Schedule:
a. Shall be furnished and installed for the following applications:
1) GC-CP1

3. Manufacturer/Model:
a. Allen-Bradley Stratix 2100
b. Prior Approved Equal

PART 3 EXECUTION

3.01 FACTORY WITNESS TEST

A. Complete factory witness testing including (but not limited to) the following equipment:

1. Motor Control Centers as specified in Section 26 24 19.
2. All standalone VFDs as specified in Section 26 29 23.
3. Control Panels as specified in Section 40 63 13.
4. Networking Equipment as specified in Section 40 67 13

B. The Owners representative will provide all necessary network equipment as indicated in the Construction Documents as being Owner furnished to complete a fully functional witness test of the Ethernet I/P protocol control scheme.

C. The Systems Integrator shall provide all required cabling and patch cords to fully connect all equipment to the network switches so as to provide a complete and functional system during the factory witness test.

D. The Hardware System Integrator shall provide their own PLC programming software used for testing the hardware and communication between equipment.

3.02 INSTALLATION

A. Wherever feasible, use bottom entry for all conduit entry into electrical control enclosures identified in this section, 40 63 14 - Junction Boxes and Control Stations #, and instruments to the extent possible

B. Install electrical components per the requirements of the Electrical design.

3.03 INSTALLATION/WORKMANSHIP

A. The workmanship and design of this equipment shall conform to all national, state and local electrical codes and ordinances that apply.

B. The control system manufacturer shall provide complete electrical schematic wiring (factory and field) diagrams showing all components together with a description of system operation. Complete information to adjust and service this equipment shall be included.

C. Wire Labels: All wires both those factory terminated by the Systems Integrator as well as field wiring terminated by the Electrical Contractor to the Control Panel shall be provided with printable heat shrink labels installed on the wire prior to termination. All markers shall be positioned such that they can be clearly read by anyone looking at them without having to adjust the wire positioning.

3.04 HARDWARE SYSTEM INTEGRATOR SERVICES

A. The hardware system integrator shall provide a PLC based control system that incorporates a personal computer to provide a higher level of control, monitoring and reporting required for this project.

B. The hardware system integrator shall provide information to the Contractor on the proper installation of Category 6 Ethernet communications cable.

C. The services of a factory trained qualified service representative that is part of the permanent staff of the hardware system integrator shall be provided to inspect the complete equipment installation to insure that it is installed in accordance with the manufacturers recommendations and for commissioning the project.

D. Provide final calibration of all instrumentation before shipping. Provide coordination necessary for the correction of interface deficiencies between instrumentation, control panels, control equipment, and final control devices. Provide written documentation on the problems found detailing device names and tags, tests conducted, diagnosis, and corrective action to be taken.

E. Perform all control panel wiring terminations and all field device wiring terminations.

F. Configure all instrumentation and control devices supplied, modified, or relocated as part of this project. Configuration shall include:

1. Configuration of transmitters to work with measuring elements.
2. Scaling of transmitters to transmit appropriate analog (4-20 mA) signal based on minimum and maximum operating range of process value being measured. Operating ranges for each device will be provided during construction.

G. Verify that each instrumentation and control device is wired and operating correctly by going “online” with each PLC, testing each field device, and witnessing correct action in the PLC through the programming software.

H. Provide Engineer with a signed certificate for each control panel stating that each device wired to it has been checked out and has been verified to be operating correctly.

I. Assign and configure a temporary IP address to each PLC Ethernet module and touch panel computer and verify that each device can be “pinged” from the corresponding Ethernet switch. Provide verification in writing to the Engineer. IP addresses will be provided by Engineer upon approval of the shop drawings.

3.05 PROGRAMMABLE LOGIC CONTROLLER (PLC) INSTALLATION

A. Refer to Section 40 63 43 for details.

3.06 SUPPLIES AND SPARE PARTS

A. Contractor shall provide all expendable items such as lamps, fuses, etc. for system startup, checkout, and during the acceptance test.

B. At Final Completion, Contractor shall furnish the following expendable items:

1. Twenty (20) percent spare fuses and lamps of each type furnished, but not less than six (6) of each type.

END OF SECTION

SECTION 40 63 43
PROGRAMMABLE LOGIC CONTROLLERS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes

1. Programmable logic controllers (PLC).
2. Input and Output (I/O) modules.
3. I/O connections and configurations.
4. Spares.

1.02 REFERENCES

A. Reference sections include, but are not limited to:

1. NEMA ICS 1 - General Standards for Industrial Control and Systems.
2. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.
3. NEMA ICS 3 - Industrial Systems.
4. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

1.03 SUBMITTALS - FOR REVIEW / APPROVAL

A. Submit manufacturer’s data in accordance with Specification Section 01 33 00 - Submittal Procedures.

1.04 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's data in accordance with Specification Section 01 78 23 - Operation and Maintenance Data including the following:

B. Include bound copies of operating instructions.

C. Include card replacement, adjustments, and preventative maintenance procedures and materials.

D. Accurately record actual locations of controller cabinets and input and output devices connected to system. Include interconnection wiring and cabling information, and terminal block layouts in controller cabinets.

1.05 QUALIFICATIONS

A. The Software System Integrator (SSI) will be providing all programming. See Section 40 61 13 - Process Control System General Requirements for approved software system integrators.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01 61 00.

B. Store and protect products under provisions of Section 01 61 00.

C. Accept products on site in factory containers and verify damage.

D. Store products in clean, dry area; maintain temperature to NEMA ICS 1.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature above 32 degrees F and below 104 degrees F during and after installation of products.

B. Maintain area free of dirt and dust during and after installation of products.

1.08 MAINTENANCE SERVICE

A. Provide a one (1) year warranty to correct equipment defects from the Date of Substantial Completion.

1.09 FURNISHING PARTY

A. Programmable Logic Controller(s) may only be noted here to provide a reference for OEM control panels being furnished as part of Division 46 in an effort to set a standard of quality throughout the entire project. Other than the spare parts listed in Part 2 of this specification, the Systems Integrator as specified in Section 40 63 13 shall not be providing control panels utilizing PLC's other than listed within the control panel schedules noted within this specification and within the engineer's drawings.

PART 2 PRODUCTS

2.01 PROGRAMMABLE LOGIC CONTROLLER(S)

A. CompactLogix 5380 Platform (L3)

1. The PLC system for each control panel shall be based on the Allen-Bradley (A-B) CompactLogix platform. Provide equipment as indicated on the Electrical Drawings and/or specifications and as required by the manufacturer.
2. Each PLC system shall consist of a power supply, processor, communications modules, and I/O modules, as specified on the Electrical Drawings. In the occasion that the specified item is not available, Contractor must submit intent to use an alternate module to Engineer and receive approval from Engineer prior to installation of the alternate module.

CompactlLogix Item:	Mfg.	Part Number
Power Supply (24VDC)	Allen-Bradley	1606-XLE240E
Processor	Allen-Bradley	5069-L306ER
Compact Flash Card	Allen-Bradley	1784-SDHC8

a. See I/O Schedule for further details

3. Control Panel Schedule:
   a. GC-CP1

2.02 CHASSIS-BASED I/O MODULE(S)

A. CompactLogix 5380 I/O

1. Each PLC system shall use the following I/O modules. In the occasion that the specified module is not available, Contractor must submit intent to use an alternate module to Engineer.

1769 CompactLogix Item:	Mfg.	Part Number
Analog Input	Allen-Bradley	5069-IF4IH
Digital Input (24VDC)	Allen-Bradley	5069-IB16
Terminal Block	Allen-Bradley	Screw Type

2.03 I/O CONNECTION & CONFIGURATION

A. All I/O points, including spares, must be factory wired to terminals as indicated in the typical wiring diagrams in the Electrical Plans. No field terminations may be made directly to the PLC Modules, with the exception of Flex I/O modules.

B. All I/O points shall be wired to the points indicated in the I/O schedule found in the Electrical Plans.

C. Programmable Controllers shall be manufactured to NEMA ICS 3 standards, with component circuit boards manufactured to NEMA ICS 2 standards.

D. Service Conditions:

1. Temperature: 0-60C
2. Humidity: 5-95% without condensation
3. Altitude: 5000 feet above sea level

E. Configuration:

1. Processor Unit: Include processor, power supply, and battery backup
2. I/O: Provide by separate expansion units or by modular hardware units
3. I/O Capacity: As required, plus 25% or 4 points for each type whichever is greater

F. Ratings:

1. Scan Rate: 1 milliseconds per KByte

2.04 SPARES

A. The Hardware Systems Integrator as specified in Section 40 63 13 shall provide the following spare PLC equipment. All equipment shall match that specified earlier in this section.

1. CompactLogix Platform:
   a. One (1) – CompactLogix Power Supply
   b. One (1) – Each CompactLogix IO module type

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Verify field measurements are as shown on Drawings.

C. Verify that required utilities are available, in proper location, and ready for use.

D. Beginning of installation means installer accepts conditions.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Do not install products until major construction is complete and building interior is enclosed and heated.

C. Connect input and output devices as shown on Drawings.

D. The PLC processor shall be installed in the control panel and all I/O terminations shall be to screw terminals unless otherwise noted.

E. Four (4) copies of all material shall be provided with final shipment. These copies shall be in addition to any required by other sections of these specifications.

F. Provide the necessary time required for field installation and verification of all I/O devices with Electrical Contractor.

3.03 MANUFACTURER'S FIELD SERVICES

A. Prepare and start systems under provisions of Section 01 75 00

B. Provide in writing to Engineer that installation and verification of all I/O devices has been performed.

C. Provide the necessary time required for field I/O testing with Engineer.

3.04 DEMONSTRATION

A. Provide systems demonstration under provisions of Section 01 75 00

B. Demonstrate operation of controller.

3.05 PLC PROGRAMMING

A. All required PLC programming for Control Panels furnished by the Hardware System Integrator as specified in section 40 63 13 - Process Control Panels and Hardware shall be by the Software System Integrator.

END OF SECTION

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SECTION 40 66 53
RADIO AND TELEMETRY EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Antennas
2. Feed-lines, Jumpers, and Connectors
3. Antenna lightning protection
4. Grounding
5. Cellular

1.02 PRIOR APPROVAL REQUIREMENTS FOR EQUIPMENT OR MATERIAL

A. The Contractor, Supplier, or Manufacturer's Representative must submit any proposed alternate substitute or substitute system manufacturers, specific alternate equipment and proposed alternate material for consideration prior to quotation submittal.

B. Approval by Engineer applies to quality and general arrangement only. The Contractor is responsible for quantities, sizes, and space requirements.

C. No extension of project completion date will be allowed for consideration or erection of non-prior approved systems, equipment, or material.

D. Proposed alternates or substitutions requirement shall include, but not be limited to, the following:

1. Full description and performance data on all proposed items with references for verification of performance for such equipment already in service.
2. Detailed description of how the proposed system, equipment and material differs from that specified including but not limited to material of construction, fabrication, operation, warranty, service, corrosion protection, maintenance requirements, lead times etc.
3. Detailed discussion of why the proposed system, equipment or material is equal or superior to that specified in construction, fabrication, operation, warranty, service, corrosion protection, maintenance requirements, etc.

E. Two (2) copies of prints showing in detail any changes in arrangements for materials, equipment, fabrication, erection, maintenance, etc.

F. Name and telephone number(s) of contact person(s) to answer questions or furnish additional information.

G. Equipment and material that are approved will be indicated by addendum in time for all bidders to fully consider such prior approvals. Bidders shall include all changes necessary to meet Specifications.

1.03 SUBMITTALS

A. Submit technical data, shop drawings, and product data for all equipment and components indicated on the Drawings and specified in Part 2 of this Section in conformance with Section 01 33 00 - Submittal Procedures including the following:

B. Shop Drawings

1. Control panel and junction box drawings including system schematic drawings, terminal numbering, component schematic drawings, dimension drawings, layout drawing and nameplate schedule. Where panels, junction boxes and new Owner-furnished equipment is being utilized, the submittal shall include complete schematics showing all proposed equipment, terminals, terminal numbering, wiring, elevations, and details. It shall be the supplier's responsibility to visit the Site and inspect existing and Owner-furnished equipment to prepare complete system drawings for the Project.
2. Overall system diagram showing all components, converters, cables, and connectors.

C. Manufacturer's Instructions: Furnish under provisions of Section 01 33 00 - Submittal Procedures.

D. Manufacturer's Field Service Reports: Reports should cover start up, demonstration and operational instructions, minimum.

E. Operation and Maintenance data in conformance with Section 01 78 23 - Operation and Maintenance Data. and including:

1. Panel equipment, junction boxes, field devices and instruments, including "as-built" system schematics. All items requested under Part 2 of this section should be included in their "as-built" form.

F. Spare Equipment Lists - Provide a list of recommended spare parts and equipment that is considered essential to the operation of the system. Include list of current prices for each item. These lists may be included with the Operation and Maintenance data submittals.

1.04 MANUFACTURER'S DATA AND DRAWINGS

A. The selected supplier shall submit "As Built" shop drawings, four (4) complete sets of the following information for the Engineer's approval:

1. Dimensioned drawings, wiring and piping drawings for all field mounted equipment. Include locations for all pipe mounted equipment.
2. Complete system schematic drawings illustrating all components being supplied, complete with electrical interconnections.
3. Detail of each device with manufacturer and complete model or part number. Provide reference list in Bill of Material form. Any devices without listing of manufacturer and part/model numbers will not be acceptable if determined to be proprietary or lacking manufacturer's service and product support.
4. All other information that the supplier feels will assist the Engineer and the Owner for operation and maintenance.
5. The Engineer expects no more than one initial review, and one re-review of the radio and telemetry systems shop drawings. The cost for subsequent resubmittal reviews will be charged to the Contractor at the Engineer's hourly rate.

1.05 MANUFACTURER'S DATA AND DRAWINGS

A. The selected supplier shall submit shop drawings under Section 01 33 00 - Submittal Procedures. Emailed electronic copies (pdf) shall be submitted which includes the following information for the Engineer's approval:

1. Comprehensive list of proposed suppliers and sub-contractors.
2. Dimensioned Drawings.
3. Descriptive Data.
4. Foundation Designs.
5. Installation Instructions.
6. All other information that the supplier/manufacturer feels will assist the Engineer and the Owner for operation and maintenance.
7. The Engineer expects no more than one initial review and one re-review of the shop drawings. The cost for subsequent re-submittal reviews will be charged to the Contractor at the Engineer's hourly rate.

B. Engineer will review and return submittals as soon as possible upon receipt. Partial submittals for distinct tasks/portions of this specification section shall be permissible.

C. Engineer will provide site plans and location staking for soils analysis and pole construction upon request. Please advise of any on-site staking needs as soon as possible.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver equipment in manufacturer's original, unopened cartons.

B. Cover and store equipment to prevent damage.

C. Handle so as to prevent damage during installation.

PART 2 PRODUCTS

2.01 ANTENNA(S)

A. Omni Directional Antenna

1. Cellular Radio applications
   a. General Specifications:
      1) Antenna Type: Omni Directional
      2) Power Rating: 25W
      3) Frequency Range: 800-1900 MHz
      4) Impedance: 50 Ohm
      5) Antenna Connection: N-Female
      6) Antenna to be mounted per manufacturers specifications using OEM mounting hardware.
   b. Omni Directional Antenna(s) shall be furnished and installed for the following application(s):
      1) GC-CP1
   c. Manufacturer/Model:
      1) SureCall SC-588W
      2) No Exceptions

2.02 CELLULAR

A. General Specifications:

1. Carrier: Verizon
2. Frequency Range: 3G/4G LTE Band 2 (1900 MHz)
3. Data Rate: 50 Mbps
4. Router/Bridge Type: Fully Integrated
5. WiFi Standards: 802.11ax Wifi 6
6. Cloud Based Subscription: 5 years
7. Communication Connections:
   a. Male SMA Antenna: 2
   b. RJ-45 Ethernet: 2
8. Operating Voltage: 9-33 VDC

B. Accessories:

1. Power connector

2. Mounting bracket
3. Antenna's

C. Radio Equipment shall be furnished and installed for the following application(s):

1. GC-CP1

D. Manufacturer/Model:

1. Cradlepoint S750 TB05-0750C4D-NN
2. No Exceptions

PART 3 EXECUTION

3.01 INSTALLATION

A. Installation, calibration, testing and initial startup of telemetry equipment stated herein shall be provided by AE2S. Cellular modem shall be delievered to the following location:

1. Advanced Engineering & Environmental Services, LLC
   a. ATTN: I&C Dep
   b. 1102 Main Street, Williston, ND 58801
2. AE2S shall field install the configured antenna utilizing the systems integrators supplied mounting equipment.

3.02 WORKMANSHIP

A. The workmanship and design of this equipment shall conform to all national, state and local codes and ordinances that apply. Complete information to this equipment shall be included.

END OF SECTION

This page intentionally left blank

SECTION 40 70 01
INSTRUMENTATION GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 REFERENCES

A. Reference Standards:

1. NFPA) 70 - National Electrical Code (NEC)
2. National Electrical Manufacturers Association (NEMA)
   a. NEMA ICS-2 - Industrial Control Devices, Controllers and Assemblies
   b. NEMA 250 - Enclosures for Electrical Equipment
3. Underwriters Laboratories (UL) - 508 Industrial Control Equipment

1.02 SCOPE

A. It is the intent of the Contract Documents that all equipment specified in this Section of the specification be supplied by the same single-source supplier (“Hardware Systems Integrator”) specified in Section 40 61 13 - Process Control System General Requirements unless noted otherwise herein or on engineer's drawings. The supplier shall assume full responsibility along with the Contractor for furnishing, installing and start-up procedures so as to make the system operate per the intent of the Contract Documents.

B. The Work specified in this Section includes furnishing, installing, start-up, testing and adjusting of all required equipment, including instruments, equipment, hardware, software, wiring, accessory equipment, and training to provide a completely operational process instrumentation and control system.

C. It shall be the responsibility of the Contractor to furnish a complete and fully operating system. The Contractor shall be responsible for all details that may be necessary to properly install, adjust and place in operation the complete installation. The Contractor shall assume full responsibility for additional costs that may result from unauthorized deviations from the Contract Documents.

D. It shall be the responsibility of the Contractor and supplier to examine all new equipment that is transmitting a signal to, or receiving a signal from, equipment specified in this Section and the associated instrumentation Sections. The Contractor shall be responsible for providing signal converters, buffer amplifiers, and isolation devices to make signal levels, reference to ground, etc. compatible between devices specified in this Section and existing equipment.

1.03 SUBMITTALS

A. All submittal requirements stated herein shall be in addition to those outlines section 01 33 00 - Submittal Procedures.

B. Shop Drawings:

1. Product technical data including:
   a. Acknowledgement that products submitted meet requirements of standards referenced.
   b. Equipment catalog cut sheets.
   c. Instrument data sheets:
      1) ISA S20 or approved equal.

      2) Separate data sheet for each instrument type.

   d. Materials of construction.
   e. Minimum and maximum flow ranges.
   f. Pressure loss curves.
   g. Physical limits of components including temperature and pressure limits.
   h. Control panel and junction box drawings including system schematic drawings, terminal numbering, component schematic drawings, dimension drawings, layout drawing and nameplate schedule. Where panels, junction boxes and new Owner-furnished equipment is being utilized, the submittal shall include complete schematics showing all proposed equipment, terminals, terminal numbering, wiring, elevations, and details. It shall be the supplier's responsibility to visit the Site and inspect existing and Owner-furnished equipment to prepare complete system drawings for the Project.
   i. Overall system diagram showing all components, converters, cables, and connectors.
2. Provide a parameter setting summary sheet for each field configurable device.
3. Certifications:
   a. Documentation verifying that calibration equipment is certified with NIST traceability.
   b. Approvals from independent testing laboratories or approval agencies, such as UL, FM or CSA.
      1) Certification documentation is required for all equipment for which the specifications require independent agency approval.

C. Technical data in conformance with Section 01 33 00 - Submittal Procedures and including:

1. All equipment and components indicated on the Drawings and specified in Part 2 of this Section
2. Junction Box Enclosures

D. Manufacturer’s Instructions

1. Furnish under provisions of Section 01 78 23 - Operation and Maintenance Data.

E. Manufacturer’s Field Service Reports

1. Furnish under provisions of Section 01 78 23 - Operation and Maintenance Data. Reports should cover a minimum of startup, demonstration, and operational instructions.

F. Operation and Maintenance data in conformance with Section 01 78 23 - Operation and Maintenance Data and including:

1. Panel equipment, junction boxes, field devices and instruments, including "as-built" system schematics. All items requested under Part 2 below should be included in their “as-built” form.

G. Spare Equipment Lists - Provide a list of recommended spare parts and equipment that is considered essential to the operation of the system. Include list of current prices for each item. These lists may be included with the Operation and Maintenance data submittals.

H. All submittals shall be searchable documents in PDF file type. They shall be electronically delivered through the platform/method all parties mutually agreed upon. The submittal shall be broken up into sections and bookmarked to allow for easier navigation throughout the submittal.

1.04 CIRCUIT IDENTIFICATION

A. Each power, control, and signal conductor shall be identified by plastic tags permanently attached to the cable. The tags shall be attached to each cable at each termination and wherever the cable is accessible in junction or pull boxes. Tags shall be marked with printing showing:

1. The circuit number from the cable and conduit schedules.
2. The terminal number as assigned by the equipment manufacturer.

B. The cable marking system shall use transparent tape with a white area where the numbering shall be typed using a typewriter or computer, as manufactured by:

1. Raychem
2. Thomas & Betts
3. Brady

C. Contractor supplied “as-built” schematics and wiring diagrams should reflect this described wire identification.

1.05 REGULATORY REQUIREMENTS

A. All Products that may come into contact with water intended for use in a public water system shall meet American National Standards Institute (ANSI)/National Sanitation Foundation (NSF) International Standards 60 and 61, as appropriate. A Product will be considered as meeting these standards if so certified by NSF, the Underwriters Laboratories, or other organization accredited by ANSI to test and certify each Product.

PART 2 PRODUCTS

2.01 REFER TO THE FOLLOWING PRODUCT SECTIONS

A. Pressure, Strain, and Force Measurement - See Section 40 73 00

B. Temperature Measurement - See Section 40 74 00

PART 3 EXECUTION

3.01 LABELING

A. Label all field mounted control devices, instrumentation, switches, etc., with tag number (if applicable) and item description.

B. Labels shall be engraved laminated plastic with 1/4" high lettering. Labels shall be attached with stainless steel screws to the device or nearby wall.

3.02 CALIBRATION, ADJUSTING AND TESTING

A. Devices requiring field calibration shall be calibrated in the presence of the Engineer's representative and documented.

3.03 PROJECT MANAGEMENT

A. Supplier shall provide engineering and administrative services necessary to fulfill the requirements of this Specification.

B. Supplier shall provide the services of an experienced project manager as the overall coordinator during the course of the project.

3.04 FIELD QUALITY CONTROL

A. Maintain accurate daily log of all startup activities, calibration functions, and final setpoint adjustments.

B. Install all instrumentation and equipment as per manufactuer's requirements. Coordinate with Engineer in Field on final instrument locations per manufacturer requirements.

C. Instrumentation Calibration:

1. Verify and document that all instruments and control devices are calibrated to provide the performance required by the Contract Documents.
   a. Utilize the Instrument Certification Sheet located at the end of this Specification Section (or Engineer approved equivalent) to document on-site calibration checks.
2. Factory furnished calibration certifications are acceptable for the following:
   a. Flow meters.
   b. Pressure sensors utilized with annular sleeve.
   c. Temperature sensors.
3. On-site calibration verification is required for all other instruments, including “smart” transmitters that have been factory calibrated.
   a. Provide calibration checks at 0 PCT, 25 PCT, 50 PCT, 75 PCT and 100 PCT of span for pressure transmitters and gages.
      1) Check for both increasing and decreasing input signals to detect hysteresis.
   b. In addition to factory calibration certification, temperature sensors and gages shall be checked at a single point for conformance to required accuracy.
   c. Level transducers/transmitters shall be checked at two points in addition to zero.
   d. Analytical sensors shall be calibrated in accordance with manufacturer’s recommendations.
   e. Check operation of all switches to verify actuation occurs in accordance with manufacturer’s specified accuracy.
   f. Replace any instrument which cannot be properly adjusted.
   g. Stroke pneumatic control valves with clean dry air to verify control action, positioner settings, and solenoid functions.
4. Calibration equipment shall be certified by an independent agency with traceability to NIST.
   a. Certification shall be up-to-date.
   b. Use of equipment with expired certifications shall not be permitted.
5. Calibration equipment shall be at least three times more accurate as the device being calibrated.

D. Loop Check-Out Requirements are as Follows:

1. Work closely with the Owner to check control signal generation, transmission, reception and response for all control loops under simulated operating conditions by imposing a signal on the loop at the instrument connections. Loop check-out work shall verify proper operation of the installed equipment and the Owner’s PLC and HMI programming.
   a. Use actual signals where available.

b. Closely observe controllers, indicators, transmitters, HMI displays, recorders, alarm and trip units, remote setpoints, ratio systems, and other control components.

1) Verify that readings at all loop components are in agreement.

2) Make corrections as required.

a) Following any corrections, retest the loop as before.

2. Stroke all control valves, cylinders, drives and connecting linkages from the local control station and from the control room operator interface.
3. Check all interlocks to the maximum extent possible.
4. Utilize the Loop Check-Out Sheet located at the end of this Specification Section (or Engineer approved equivalent) to document on-site calibration checks.
5. In addition to any other As-Recorded Documents, record all setpoint and calibration changes on all affected Contract Documents and turn over to the Owner.

3.05 FIELD QUALITY CONTROL - INSTALL, START-UP AND WITNESS TESTING

A. Contractor shall furnish and install raceway and wiring systems for the instrumentation and control system in accordance with manufacturer's requirements and in accordance with Sections 26 05 34 - Conduit. All instrumentation and control system raceways shall be galvanized rigid steel conduit unless specifically indicated otherwise.

B. Supplier shall provide a skilled programmer/instrumentation engineer or technician who shall complete troubleshooting and start-up to place the entire system into satisfactory operation. The engineer or technician shall make the necessary inspection of the completed installation, make the necessary final field adjustments, and make program revisions as required for start-up.

C. Coordinate installation, start-up and testing scheduling with Owner and Engineer.

D. Instruct Owner's personnel at the Site on the operation and maintenance of equipment furnished in this Section.

E. Furnish Owner and Engineer with a written report prepared by Supplier certifying that equipment:

1. Has been properly installed.
2. Is in accurate alignment and calibration and is free from undue stress imposed by interconnecting cable/conduit, etc.
3. Has been operated and witness demonstrated to the Owner under expected conditions and that it operates satisfactorily.

3.06 ON-SITE SERVICES

A. In addition to other services specified, provide a competent instrumentation engineer or technician to perform the following services:

1. Training – two (2), eight (8) hour days on-Site to train Owner's personnel on operation and maintenance of all equipment furnished under this Section.

B. All on-Site service shall be at times approved by the Owner.

END OF SECTION

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SECTION 40 73 00
PRESSURE MEASUREMENT

PART 1 GENERAL

1.01 REFER TO PART 1 GENERAL OF SECTION 40 70 01 - INSTRUMENTATION GENERAL REQUIREMENTS .

PART 2 PRODUCTS

2.01 PRESSURE TRANSDUCER - STANDARD

A. General Specifications

1. Input Voltage: 10.5-42.5 VDC Loop Powered
2. Output Signal: Two (2) Wire 4-20mA
3. Accuracy (Static): 0.1%FS
4. Sensing Range: Refer to IO Schedule
5. Temperature Ratings: -30-100°C
6. Process Connection (Application Dependent): 1/4" NPT

B. Schedule

1. Pressure Transducers shall be furnished and installed for the following application(s):

C. Manufacturer/Model

1. Keller Preciseline
2. Prior Approved Equal

PART 3 EXECUTION

3.01 REFER TO PART 3 EXECUTION OF SECTION 40 70 01 - INSTRUMENTATION GENERAL REQUIREMENTS.

END OF SECTION

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SECTION 40 73 13
PRESSURE AND DIFFERENTIAL PRESSURE GAUGES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Furnishing and installation of the following, as indicated, in accordance with the provision of the Contract Documents:
   a. Pressure Gauges.
   b. Taps and Bends.
   c. Stopcocks.
   d. Filter Snubber.

B. Related Sections include:

1. Section 40 05 19 - Ductile Iron Process Pipe
2. Section 40 05 58 - Process Valves

1.02 SUBMITTALS

A. Shop Drawings and Product Data shall be submitted in accordance with specification Section 01 33 00.

B. Operations and Maintenance Data shall be submitted in accordance with specification Section 01 78 23.

PART 2 PRODUCTS

2.01 WORKING PRESSURE

A. Working pressure of pipe specialties to be equal to working pressure of connecting pipes, unless specified otherwise.

2.02 APPROVED MANUFACTURERS

A. Pressure Gauges:

1. Trerice No. 700.
2. Approved Equivalent.

2.03 PRESSURE GAUGES

A. General:

1. Case: Type 304 stainless steel with satin finish.
2. Size:

a. 2.5-inch diameter when mounted less than 7-feet above finished floor.

3. Units: PSI
4. Window: Laminated safety glass.
5. Provide with dial having white background and black figures and graduations. Pointer shall be micro-adjustable.
6. Install brass tee handle cock on each pressure gauge.
7. Fill gauge with glycerin.
8. Accuracy shall be ASME Grade 2A per ANSI B40.100.
9. Gauges shall be selected so that normal operating pressures fall at approximately mid-scale and so that continuous operation does not exceed 75% of full scale.

B. Taps and bends: As required for proper positioning of gauge for reading and maintenance.

C. Stopcocks: Trerice Series 865L gauge cock. Provide required brass nipples and associated piping accessories for a complete and functional installation.

D. Filter Snubber:

1. Provide snubbers on pressure gauge assemblies.
2. Manufacturer:
   a. Trerice Series 872-5 suitable for water service
   b. Grainger Approved Vendor
3. Type: Filter type
4. Size: ¼”
5. Pressure rating: 2,000 psi
6. Material: Stainless Steel

PART 3 EXECUTION

3.01 INSTALLATION

A. Refer to the Drawings for design details for each installation.

B. Install gauges with shut off cocks in straight runs of piping so that they may be read from floor.

C. Provide extension necks on pressure taps in insulated piping, vessels, and equipment.

D. Provide isolating seal complete with bleed/fill screw where process media are injurious to gauge internals or otherwise required.

E. Install pressure gauges, filter snubbers, and miscellaneous accessories at all locations indicated on the Drawings.

END OF SECTION

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SECTION 40 74 00
TEMPERATURE MEASUREMENT

PART 1 GENERAL

1.01 REFER TO PART 1 GENERAL OF SECTION 40 70 01 - INSTRUMENTATION GENERAL REQUIREMENTS.

PART 2 PRODUCTS

2.01 AMBIENT AIR TEMPERATURE SENSOR/TRANSMITTER

A. Transmitter General Specifications

1. Continuous averaging, 1000 ohm, suitable for wall mounting platinum RTD type temperature sensor
2. Shall be of same manufacturer as the sensor and calibrated for use
3. Electrical Connection: M20 Cable Gland, 2 Wire
4. Power Requirements: 4-20 mA Loop Powered
5. Output Signal: 4-20 mA
6. Operating Range: -40 to 185°F
7. Stainless Steel Tag

B. Sensor General Specifications

1. Accuracy: ± 0.1°C, ± 0.05% of reading
2. Thermal Drift: 0.0025% / °C
3. Response Time: 1 Second (90% Response)
4. Internal Resistance: 1000 Ohms

C. Schedule

1. Temperature sensor and transmitter shall be furnished and installed for the following application(s):
   a. GC-TT1 (Control Panel)

D. Spares

E. Manufacturer/Model

1. Omega-EWSA-PT100-TX
2. Prior Approved Equal

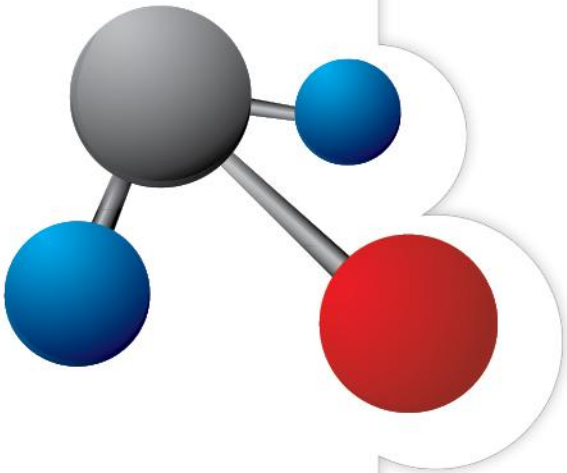
PART 3 EXECUTION

3.01 REFER TO PART 3 EXECUTION OF SECTION 40 70 01 - INSTRUMENTATION GENERAL REQUIREMENTS.

END OF SECTION

APPENDIX A

WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PUMP STATION



PREPARED FOR:

City of Williston, North Dakota

AE2S Project No. P00581-2025-003

February 2026

PROJECT MANUAL

Advanced Engineering and Environmental Services LLC
4170 28th Avenue South
Fargo, ND 58104
Ph: 701-364-9111 Web: www.AE2S.com

PLANS AND SPECIFICATIONS
FOR
WILLISTON WRRF REUSE PUMP STATION

February 2026

CIVIL ENGINEER

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of North Dakota.

Responsible for Divisions 00, 01, and 02



Kevin Johnson, PE, AE2S, LLC

Date: 2/20/2026 Reg. No. PE-4964

ELECTRICAL ENGINEER

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of North Dakota.

Responsible for Division 16



Adam Wahler, PE, AE2S, LLC.

Date: 2/20/2026 Reg. No. PE-7886

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BIDDING REQUIREMENTS

ADVERTISEMENT FOR BIDS

00030

OWNER: City of Williston, ND
ADDRESS: City Hall
22 East Broadway, Williston, ND 58801

Separate sealed Bids for construction of the **Williston WRRF Reuse Pump Station;** will be received at the office of the City of Williston, City Hall, 22 East Broadway, Williston, ND 58801, or online at Quest via vBid, until **3:00 p.m.**, local time, on the **25th day of March 2026** where and at which time shortly thereafter they will be publicly opened and read aloud.

Bids can be mailed to: City of Williston
Attn: Bid for Williston WRRF Reuse Pump Station
City Hall
PO Box 1306
Williston, ND 58802 - 1306

The Work is comprised of one (1) Contract: **Contract No. 1 – Procurement Bid.** Individual Bids will be received for the Contract. The Work for the Contract is generally described as follows:

Contract No. 1 – Procurement Bid Only: Manufacture and Supply of Prefabricated Pump Station. The prefabricated pump station includes: the steel pump station structure including walls, floor, and ceiling, for a buried installation; foundation and roof support systems for the buried installation; stairway access to the buried pump station vault; access hatches; two (2) 500 gpm and one (1) 50 gpm multistage vertical centrifugal pumps, motors, and variable frequency drives; a magnetic flow meter; process piping and valves; sump pump; unit heater; dehumidifier; lighting, electrical, and control systems; and related appurtenances. This contract includes the furnishing and delivery of the prefabricated pump station to the Owner's delivery location by the date specified. Installation of the pump station will be completed under a separate contract.

All Bids shall be prepared according to the Instructions to Bidders contained within the Project Manual. Each Bid shall be accompanied by a separate envelope containing a Bid Security in the form of a Bidder's Bond executed by the Bidder as principal and by a surety company authorized to do business in the State of North Dakota, payable to the City of Williston, in a sum equal to five percent (5%) of the full amount of the Bid. A certified check in lieu of a surety company in the amount of 5% of the total project cost **will not** be accepted. This is to serve as a guarantee that the successful Bidder will enter into a Contract within fifteen (15) days of Notice of Award, in accordance with the terms of the principal's Bid and Contractor's Bond as required by law and regulations and determinations of the City of Williston for the performances of such Work. Only Bids that are accompanied by such a Bond will be considered.

All Work shall be performed in accordance with the Bidding Documents on file in the Office of the City Engineer, Williston, ND where they may be seen and examined. Bidders must be licensed for the full amount of the Bid as required by North Dakota Century Code 43-07-12. All Bids must be submitted on the Bid Form furnished by the Engineer. No Bid will be read or considered that does not fully comply with the above provisions and other provisions contained within the Bidding Documents, and any deficient Bid submitted will be returned to the Bidder unopened.

Contracts shall be awarded on the basis of the low Bid submitted by a responsible and responsive Bidder deemed most favorable to the Owner's interest.

All Bids shall be contained in a sealed envelope plainly marked showing that such envelope contains a Bid for the Project. In addition, the Bidder shall place upon the exterior of such envelope the following information:

1. Project Name and Work covered by the Bidder (General).
2. The name of the Bidder.
3. Separate envelope containing Bid Bond.
4. Acknowledgement of all Addenda.

Copies of the Bidding Documents may be seen and examined at the office of the Owner, the **City of Williston**, City Engineer, 1121 5th Street East, Williston, ND 58801. The Bidding Documents are available in the form of printed plans and specifications and/or PDF compact discs (CDs) from Advanced Engineering and Environmental Services, LLC. The costs are $100.00 for CDs and $300.00 for printed documents, for each set of Documents obtained. Payment for Bidding Documents is **NON-REFUNDABLE**. All Work shall be done according to the Bidding Documents. Bidding Documents may also be examined at the offices of AE2S in Williston, ND; Bismarck, ND; Grand Forks, ND; and Maple Grove, MN; and Builders' exchanges in Grand Forks, Bismarck, Minot, and Fargo, ND, and in Minneapolis, MN.

Digital copies of the Project Plans, Specifications, Bid Forms and Contract Documents are also available at www.questcdn.com. These documents may be downloaded by selecting this project from the "Bid Documents" tab and by entering Quest Project Number **10073253** on the "Search Projects" page. For assistance and free membership registration, contact QuestCDN at (952) 233-1632 or info@questcdn.com.

The work for each contract must be completed no later than the following:

Contract No. 1 – Procurement Bid Only:
Fabricated and delivered to the Buyer at the specified point of destination by **April 1, 2027**.

All Bids will be made on the basis of cash payment for such work. After Bid opening, the Owner will return Bid security of all except the three lowest responsible Bidders. When the Contract is awarded, the remaining unsuccessful Bidder's Bonds will be returned. The Owner reserves the right to reject any or all Bids, and further reserves the right to award the Contract in the best interests of the Owner. The Owner reserves the right to hold the three (3) low Bids for a period of sixty (60) days after the date of the Bid opening to complete financial arrangements.

Dated this 24th day of February 2026.

By: /s/ David Juma, City Engineer
City of Williston
Publish on 2/28/2026, 3/7/26, 3/14/26

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

INSTRUCTIONS TO BIDDERS FOR PROCUREMENT CONTRACT

Prepared By

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

ACEC
AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

NSPE®
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INSTRUCTIONS TO BIDDERS FOR PROCUREMENT CONTRACTS

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INSTRUCTIONS TO BIDDERS FOR PROCUREMENT CONTRACT

ARTICLE 1—DEFINED TERMS

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

A. *Issuing Office*—The office from which the Procurement Bidding Documents are to be issued and where the bidding procedures are to be administered.

ARTICLE 2—PROCUREMENT BIDDING DOCUMENTS

2.01 Bidder may obtain complete sets of the Procurement Bidding Documents, in the number and for the deposit sum, if any, stated in the advertisement or invitation to bid, from the Issuing Office. The deposit will be refunded to each document holder of record who returns a complete set of Procurement Bidding Documents in good condition within 30 days after opening of Bids. Bidders must obtain a complete set of the Procurement Contract Documents as listed in the Procurement Agreement.

2.02 Bidder must use a complete set of the Procurement Bidding Documents in preparing the Bid; neither Buyer nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Procurement Bidding Documents.

2.03 Buyer and Engineer make copies of Procurement Bidding Documents available on the above terms only for obtaining Bids for furnishing Goods and Special Services, and do not authorize or confer a license for any other use.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

3.01 Buyer may at any time conduct such investigations as Buyer deems necessary to establish the responsibility, qualifications, and financial ability of Bidder, and after the opening of Bids may require a Bidder to submit documentation of its qualifications, including but not limited to

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financial data and documentation of previous experience providing goods and services comparable to the specified Goods and Special Services.

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

3.03 Bidder shall submit a qualifications statement with the Bid, including financial data and documentation of previous experience providing comparable goods and services, to demonstrate Bidder's qualifications to furnish the specified Goods and Special Services.

3.04 The Buyer may request from the Bidder evidence of the Bidder's authority and qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the contract.

ARTICLE 4—SITE VISIT; PRE-BID CONFERENCE

4.01 A pre-bid conference will not be held for this procurement.

4.02 Interpretations or clarifications considered necessary by Engineer in response to questions arising at the pre-bid conference will be issued by Addenda delivered to all parties recorded by Engineer as having received the Procurement Bidding Documents. Only answers in the Addenda will be binding. Oral statements, interpretations, and clarifications may not be relied upon in the preparation of a Bid, and will not be binding or legally effective.

ARTICLE 5—INTERPRETATIONS AND ADDENDA

5.01 All questions about the meaning or intent of the Procurement Bidding Documents are to be submitted to Engineer in writing at:

City of Williston
Attn: David Juma, PE
1121 5th Street East
PO Box 2437
Williston, ND 58802

5.02 Interpretations or clarifications considered necessary by Engineer in response to such written questions will be issued by Addenda mailed or delivered to all parties recorded as having received the Procurement Bidding Documents. Questions received less than 10 days prior to the date for opening of Bids will not be answered. Only answers in the Addenda will be binding. Oral statements, interpretations, and clarifications may not be relied upon in the preparation of a Bid, and will not be binding or legally effective.

5.03 Addenda may be issued to clarify, correct, or change the Procurement Bidding Documents as deemed advisable by Buyer or Engineer.

ARTICLE 6—BID SECURITY

6.01 A Bid must be accompanied by Bid security made payable to Buyer in an amount of five (**5)** percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 5.01 of the General

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Conditions. Such Bid bond will be issued in the form included in the Procurement Bidding Documents.

6.02 The Bid security of the apparent Successful Bidder will be retained until Buyer (Project Owner) awards the Procurement Contract to such Bidder, and such Bidder has executed the Procurement Contract, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Procurement Contract and furnish the required contract security within 15 days after the Notice of Award, Buyer (Project Owner) may consider Bidder to be in default and annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Buyer's damages in the case of a damages-form bond. Such forfeiture will be Buyer's exclusive remedy if Bidder defaults.

6.03 The Bid security of other Bidders that Buyer believes to have a reasonable chance of receiving the award may be retained by Buyer until the earlier of 7 days after the Effective Date of the Procurement Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

6.04 Bid security of other Bidders that Buyer believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 7—PROCUREMENT CONTRACT TIMES

7.01 See applicable provisions in the Procurement Agreement.

ARTICLE 8—LIQUIDATED DAMAGES

8.01 Any provisions for liquidated damages, such as those for Seller's failure to attain a specified Milestone such as the delivery of the Goods, are set forth in the Procurement Agreement.

ARTICLE 9—CONFIDENTIALITY OF BID INFORMATION

9.01 Confidential information is information in the Bid, or in documents submitted by Bidder with the Bid or submitted subsequent to the opening of Bids in support of the Bid, that Bidder clearly and prominently labels in writing to be a trade secret, proprietary, or confidential. Bids will be opened and accompanying documents, if any, will be maintained in a manner that endeavors to avoid disclosing confidential information to third parties, to the extent allowed by Laws and Regulations.

9.02 Bidder shall clearly and prominently mark confidential information with the word "CONFIDENTIAL" on each page or sheet or on the cover of bound documents. Place "CONFIDENTIAL" stamps or watermarks so that they do not obscure any of the required information on the document, either in the original or in a way that would obscure any of the required information in a photocopy of the document.

9.03 If Buyer is requested to disclose confidential information, becomes legally compelled to disclose confidential information, or is required by a regulatory body, governing agency, or controlling authority to disclose confidential information, or make any other disclosure that is prohibited or otherwise constrained by these Procurement Bidding Requirements, Buyer will provide Bidder with prompt notice so Bidder may seek a protective order or other appropriate remedy. Bidder will be solely responsible for submitting to the regulatory body, governing agency, or controlling

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authority any arguments, briefs, memoranda, motions, authorities, or other information in opposition to disclosure.

9.04 Buyer's obligations with respect to confidential information are nullified by the following exceptions:

A. Confidential information becomes a part of the public domain through publication or otherwise, through no fault of the Buyer;

B. Buyer can demonstrate through suitable documentation that the confidential information was already in the Buyer's possession, and not previously marked as confidential, or was otherwise publicly available prior to the date of Bid submittal;

C. The confidential information is subsequently and independently disclosed to the Buyer by a third party who has a lawful right to disclose such information;

D. Buyer concludes in good faith that the information is not confidential, or that disclosure is required or justified; or

E. Buyer is required to disclose the confidential information by court order or by applicable Laws and Regulations.

9.05 Notwithstanding any other provision of the Procurement Bidding Documents, it is stipulated and agreed that by accepting a Bid, Buyer has not and does not waive its legal immunity (if any) from suit or liability.

ARTICLE 10—"OR-EQUAL" ITEMS

10.01 The Procurement Contract, if awarded, will be based on material and equipment specified in the Procurement Bidding Documents without consideration of possible "or-equal" items. Whenever it is specified or described in the Procurement Bidding Documents that an "or-equal" item of material or equipment may be furnished or used by Seller if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Procurement Contact. The procedure for submittal of any such application by Seller and consideration by Engineer is set forth in the General Conditions and may be supplemented in the Procurement Specifications.

10.02 The Procurement Contract, if awarded, will be based on materials and equipment specified or described in the Procurement Bidding Documents. Bidders may propose "or equal" materials and equipment, which if approved by Engineer will be identified by Addendum. The materials and equipment described in the Procurement Bidding Documents establish a standard of required type, function, and quality to be met by any proposed "or-equal" item. No item of material or equipment will be considered by Engineer as an "or-equal" unless written request for approval has been submitted by Bidder and has been received by Engineer no later than 15 days after the advertisement or invitation to bid is first issued. Each such request shall conform to the requirements of Paragraph 7.04 of the General Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item as an equal will be final. Bidders shall not rely upon approvals unless set forth in an Addendum. Send requests to:

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City of Williston
Attn: David Juma, PE
1121 5th Street East
PO Box 2437
Williston, ND 58802

ARTICLE 11—PREPARATION OF BID

11.01 The Bid Form is included with the Procurement Bidding Documents. Additional copies of Procurement Bidding Documents may be obtained from the Issuing Office.

11.02 All blanks on the Bid Form must be completed and the Bid Form must be signed by an individual authorized to act on behalf of the Bidder. Alterations must be initialed by an individual authorized to act on behalf of the Bidder. A Bid price must be indicated for each item in the Bid Form. In the case of optional alternates, the words "No Bid" may be entered.

11.03 Bidder must acknowledge all Addenda by filling in the number and date of each Addendum in the Bid Form and sign where indicated to verify that the Addenda were received. A Bid that does not acknowledge receipt of all Addenda may be considered non-responsive.

11.04 Bidder shall:

A. Sign the Bid Form as indicated in the Bid Form.

B. Include evidence of authority to sign.

C. Provide information on the individual to be contacted for any communications regarding the Bid.

D. Provide evidence of the Bidder's authority and qualification to do business in the locality of the Project, to the extent required, or indicate the ability to obtain such authority and qualification prior to award of the Procurement Contract.

11.05 The responsibilities of each Bidder submitting a Bid are described in the Bidder's representations and certifications set forth in Article 6 of the Bid Form.

ARTICLE 12—BASIS OF BID; COMPARISON OF BIDS

12.01 *Lump Sum*

A. Bidder shall submit a Bid on a lump sum basis as set forth in the Bid Form.

B. The apparent low Bid will be determined on the basis of the lump sum bid amount.

ARTICLE 13—SUBMITTAL OF BID

13.01 Bidder shall refer to the **"Advertisement for Bids"** for specific identification of the date, time, and place where Bids are to be submitted.

13.02 Bidder shall prepare his Bid as follows:

A. Mailing Option

1. Enclose in an opaque sealed envelope:

a. Completed Bid Form

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2. Mark on the outside of the opaque sealed envelope:

   a. "BID ENCLOSED"
   b. City of Williston
      City Hall
      PO Box 1306
      Williston, ND 58802 - 1306

   c. Bid for: Williston WRRF Reuse Pump Station

   d. Bid from: (Name and address of the Bidder)
   e. Acknowledgement of receipt of Addenda _____ through _____.
      (Fill in appropriate Addendum numbers.) **Any Bidder who fails to acknowledge receipt of Addenda on the outside of the Bid envelope may be considered non-responsive and that Bid may not be opened.**

3. Attach to outside of sealed opaque envelope containing the bid a separate sealed envelope containing the following completed items:

   a. Bid Bond. See Section 00430.

   b. Bidder's Qualification Statement per Article 3.03

   c. Affidavit of Non-Collusion Form (00450)

4. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid and the associated attached Bid Security envelope shall be enclosed in a separate envelope, plainly marked on the outside with the notation "BID ENCLOSED."

5. The mailed Bid shall be addressed to:

   City of Williston
   City Hall
   PO Box 1306
   Williston, ND 58802- 1306

B. QuestCDN vBid System Option

1. Required Attachments to be uploaded

   a. Signed and Scanned Bid Form with Acknowledgement of Addenda
   b. Bid Bond. See Section 00430.
   c. Bidder's Qualification Statement per Article 3.03
   d. Affidavit of Non-Collusion Form (00450)

2. Required Forms to be completed.
   a. Complete online Bid Form for reference purposes; Sign and Scanned Bid Form shall govern over any discrepancies."

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ARTICLE 14—MODIFICATION OR WITHDRAWAL OF BID

14.01 A Bid may be modified or withdrawn by a document duly signed in the same manner that a Bid must be signed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

14.02 If, within 24 hours after Bids are opened, any Bidder files a duly signed written notice with Buyer and promptly thereafter demonstrates to the reasonable satisfaction of Buyer that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned.

ARTICLE 15—OPENING OF BIDS

15.01 Bids will be publicly opened at the time and place indicated in the advertisement or invitation to bid and read aloud, unless obviously non-responsive. An abstract of the amounts of the Base Bids and Alternate Bids, if any, will be made available to Bidders after Bids have been opened and reviewed by the Buyer.

15.02 Bids will be opened publicly.

ARTICLE 16—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 17—EVALUATION OF BIDS AND AWARD OF PROCUREMENT CONTRACT

17.01 Buyer reserves the right to reject any and all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Buyer also reserves the right to waive all informalities not involving price, time, or changes in the Goods and Special Services.

17.02 Buyer will reject the Bid of any Bidder that Buyer finds, after reasonable inquiry and evaluation, to not be responsible.

17.03 In evaluating Bids, Buyer will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data as may be requested in the Bid Form or may be requested from Bidders prior to a Notice of Award.

17.04 If Buyer awards the Procurement Contract, such award will be to the responsible Bidder submitting the lowest responsive Bid.

ARTICLE 18—BONDS AND INSURANCE

18.01 Article 5 of the General Conditions and Article 5 of the Supplementary Conditions set forth Buyer's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the signed Procurement Agreement to Buyer, it must be accompanied by such bonds and acceptable evidence of insurance.

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ARTICLE 19—SIGNING OF PROCUREMENT AGREEMENT

19.01 When Buyer issues a Notice of Award to the Successful Bidder, it will be accompanied by the unsigned counterparts of the Procurement Agreement along with the other Procurement Contract Documents identified in the Procurement Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Procurement Agreement and any bonds and insurance documentation required to be delivered by the Procurement Contract Documents to Buyer. Within 10 days thereafter, Buyer will deliver one fully executed counterpart of the Procurement Agreement to Successful Bidder, together with printed and electronic copies of the Procurement Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 20—SALES AND USE TAXES

20.01 Buyer is exempt from **North Dakota** state sales and use taxes on materials and equipment to be incorporated in the Project. Exempt taxes must not be included in the Bid. Refer to P-800, Paragraph SC-7.05 for additional information.

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

BID FORM FOR PROCUREMENT CONTRACT

Prepared By

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

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BID FORM FOR PROCUREMENT CONTRACT

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BID FORM FOR PROCUREMENT CONTRACT

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

ARTICLE 1—BUYER AND BIDDER

1.01 This Bid is submitted to:

City of Williston

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into a Procurement Contract with Buyer in the form included in the Procurement Bidding Documents, and to furnish the Goods and Special Services as specified or indicated in the Procurement Bidding Documents, for the prices and within the times indicated in this Bid, and in accordance with the other terms and conditions of the Procurement Bidding Documents.

ARTICLE 2—BASIS OF BID

2.01 *Lump Sum Bids*

A. Bidder will furnish the Goods and Special Services in accordance with the Procurement Contract Documents for the following Procurement Contract Price(s):

1. Lump Sum Bid Price (Base Bid)

Lump Sum Bid Price for Base Bid	$

ARTICLE 3—TIME OF COMPLETION

3.01 Bidder agrees that the furnishing of Goods and Special Services will conform to the schedule of Procurement Contract Times set forth in Article 2 of the Procurement Agreement.

3.02 Bidder accepts the provisions of the Procurement Agreement as to liquidated damages.

ARTICLE 4—ATTACHMENTS TO THIS BID

4.01 The following documents are attached to and made a condition of this Bid:

A. Bid Bond. See Section 00430.

B. Bidder's Qualifications Statement per Article 3.03 of Section P200.

C. Non-Collusion Affidavit. See Section 00450.

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ARTICLE 5—BIDDER'S ACKNOWLEDGMENTS

5.01 Bidder accepts all terms and conditions of the Instructions to Bidders. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period that Bidder may agree to in writing upon request of Buyer.

5.02 Bidder has examined and carefully studied the Procurement Bidding Documents, the related data identified in the Procurement Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged:

Addendum No.	Addendum Date

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder's Representations*

A. In submitting this Bid, Bidder represents that:

1. Bidder has examined and carefully studied the Procurement Contract Documents.

2. If required by the Instructions to Bidders to visit the Point of Destination and the site where the Goods are to be installed or Special Services will be provided, or if, in Bidder's judgment, any observable local or site conditions may affect the delivery, cost, progress, or furnishing of the Goods and Special Services, then Bidder has visited the Point of Destination and site where the Goods are to be installed or Special Services will be provided (as applicable) and become familiar with and is satisfied as to the observable local and site conditions that may affect delivery, cost, progress, and furnishing of the Goods and Special Services.

3. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect the cost, progress, and performance of Seller's obligations under the Procurement Contract.

4. Bidder has carefully studied, considered, and correlated the information known to Bidder with respect to the effect of such information on the cost, progress, and performance of Seller's obligations under the Procurement Contract.

5. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Procurement Contract Documents, and the written resolution (if any) thereof by Engineer is acceptable to Bidder.

6. The Procurement Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance of Seller's obligations under the Procurement Contract.

7. The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of the Bidding Requirements, that without exception the Bid (including all Bid prices) is premised upon furnishing the Goods and Special Services as required by the Procurement Contract Documents.

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6.02 *Bidder's Certifications*

A. Bidder certifies that:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

3. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Procurement Contract. For the purposes of this Paragraph 6.02.A.4:

a. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;

b. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Buyer, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Buyer of the benefits of free and open competition;

c. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Buyer, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

d. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process.

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This Bid is offered by:

Bidder:

_____

(typed or printed name of organization)

By: _____

(individual's signature)

Date: _____

(date signed)

Name: _____

(typed or printed)

Title: _____

(typed or printed)

(If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____

(individual's signature)

Title: _____

(typed or printed)

Address for giving notices:

_____

_____

_____

Designated Representative:

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Address:

_____

_____

_____

Phone: _____

Email: _____

License No.: _____

Classification: _____

Limitation: _____

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BID BOND FORM

00430

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BID BOND

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

BIDDER (Name and Address):

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

OWNER (Name and Address):

BID
Bid Due Date:
Project (Brief Description Including Location):

BOND
Bond Number:
Date (Not later than Bid due date):
Penal sum _____ _____
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER	SURETY
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature and Title	Signature and Title (Attach Power of Attorney)
Attest: _____	Attest: _____
Signature and Title	Signature and Title

Note: Above addresses are to be used for giving required notice.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Surety's liability.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

3.2. All Bids are rejected by Owner, or

3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

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

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

AFFIDAVIT OF NON-COLLUSION
00450

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AFFIDAVIT OF NON-COLLUSION

STATE OF _____

COUNTY OF _____

I hereby swear (affirm) under penalty of perjury:

1. That I am the Bidder (if Bidder is an individual), a partner in the Bidder (if Bidder is a partnership), or an officer or employee of the Bidder (if Bidder is a corporation) having authority to sign on its behalf;

2. That the attached Bid or Bids have been arrived at by the Bidder individually and have been submitted without collusion with, and without any agreement, understanding or planned common course or action with any vendor of materials, suppliers, equipment, or services described in the invitation to bid designed to limit individual bidding or competition;

3. That the contents of this Bid or Bids have not been communicated by Bidder or its employees or agents to any person not an employee or agent of the Bidder or its surety on any bond furnished with the Bid or Bids, and will not be communicated to any such person, prior to any official opening of the Bid or Bids; and

4. That I have fully informed myself regarding the accuracy of the statements made in this affidavit.

_____
Signature of Bidder

Subscribed and sworn before me this

_____ day of _____20___

_____
Position

_____
Notary

_____
Company Name

(seal)

_____
Date

This page intentionally left blank

CONTRACT FORMS

NOTICE OF AWARD

DATE: _____

TO: _____
(Contractor)

ADDRESS: _____

_____

PROJECT: Williston WRRF Reuse Pump Station
Contract No.1 – Prefabricated Pump Station

CONTRACT FOR: _____

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:

Contract No.1 – Prefabricated Pump Station

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, Unit Price Work, and Work performed on a cost-plus-fee basis, as applicable.

Three (3) unexecuted counterparts of the Agreement accompany this Notice of Award.

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

1. Deliver to Owner **Three (3)** counterparts of the Agreement, signed by Bidder (as Contractor).

2. Deliver with the signed Agreement(s) the Contract security (such as required performance and payment bonds) and insurance documentation, as specified in the Instructions to Bidders and in the General Conditions, Articles 2 and 6.

3. Other conditions precedent (if any): Current Workmen's Compensation Certificate of Premium Paid.

After execution of the Agreement, please send all copies of the Contract, along with the above items to the Engineer, **Advanced Engineering and Environmental Services, LLC.**, 4170 28th Ave. S, Fargo, ND 58104.

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 30 days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

City of Williston
Owner

By: _____
Authorized Signature

ACCEPTANCE OF AWARD

_____
Contractor

By: _____

Title: _____

Date: _____

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

AGREEMENT BETWEEN BUYER AND SELLER FOR PROCUREMENT CONTRACT

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AGREEMENT BETWEEN BUYER AND SELLER FOR PROCUREMENT CONTRACT

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AGREEMENT BETWEEN BUYER AND SELLER FOR PROCUREMENT CONTRACT

This Procurement Agreement is by and between the **City of Williston** ("Buyer") and **[formal name of entity]** ("Seller").

Terms used in this Procurement Agreement have the meanings stated in the General Conditions of the Procurement Contract and the Supplementary Conditions of the Procurement Contract.

Buyer and Seller hereby agree as follows:

ARTICLE 1—PROCUREMENT CONTRACT

1.01 *Goods and Special Services*

A. Seller shall furnish the Goods and Special Services as specified or indicated in the Procurement Contract Documents. The Goods and Special Services are generally described as follows: **Williston WRRF Reuse Pump Station.**

1.02 *The Project*

A. The Project, of which the Goods and Special Services are a part, is generally described as follows: **Manufacture and Supply Prefabricated Booster Pump Station.**

1.03 *Engineer*

A. Buyer has retained **AE2S, LLC** ("Engineer"), to prepare Procurement Contract Documents and act as Buyer's representative. Engineer assumes all duties and responsibilities and has the rights and authority assigned to Engineer in the Procurement Contract Documents in connection with Seller's furnishing of Goods and Special Services.

1.04 *Point of Destination*

A. The Point of Destination is designated as: **48°08'23.87"N 103°36'21.52"W (Williston Water Resource Recovery (WRRF), Williston, ND.**

ARTICLE 2—PROCUREMENT CONTRACT TIMES

2.01 *Time of the Essence*

A. All time limits for Milestones, including the submittal of Shop Drawings and Samples, the delivery of Goods, and the furnishing of Special Services as stated in the Procurement Contract Documents, are of the essence of the Procurement Contract.

2.02 *Schedule of Procurement Contract Times*

A. The following schedule sets forth the Procurement Contract Times:

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Milestone	Date or Days	Notes
Submit Shop Drawings	July 1,2026	
Deliver acceptable Goods to Point of Destination (All materials and equipment shall be delivered to the Point of Destination and be ready for installation By Others under a separate contract).	April 1, 2027	Delivery may be made earlier when fabrication is completed of delivery date if the Owner is ready for shipment. This will be the date Liquidated Damages will be a basis of.
Readiness for Final Inspection and Acceptance of Goods and Special Services (Pump Station shall be completely installed By Others under a separate contract and shall be fully operational with all testing, corrections, and adjustments having been made).	May 1, 2027	Confirmation by Buyer or Engineer that the Pump station is as intended in the contract documents before releasing final payment. This will be completed when confirmation can be achieved.

2.03 *Shop Drawings and Samples*

A. *Submittal of Shop Drawings and Samples*: Seller shall submit all Shop Drawings and Samples required by the Procurement Contract Documents to Engineer for its review and approval.

B. *Engineer's Review*: It is the intent of the parties that Engineer will conduct its review of Shop Drawings and Samples and issue its approval, or a denial accompanied by substantive comments regarding information needed to gain approval, within **14** days after Seller's submittal of such Shop Drawings and Samples, or within such longer period that is needed because of the quantity and quality of such submittals. Resubmittals will be limited whenever possible.

2.04 *Liquidated Damages*

A. Buyer and Seller recognize that time is of the essence as stated in Paragraph 2.01, and that Buyer will suffer financial and other losses if the Goods are not delivered to the Point of Destination and ready for receipt of delivery by Buyer within the time specified in Paragraph 2.02, plus any extensions thereof allowed in accordance with this Procurement Contract. The parties also recognize that the timely performance of services by others involved in the Project is materially dependent upon Seller's specific compliance with the delivery requirements of Paragraph 2.02. Further, the parties recognize the time, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the loss (whether direct, consequential, or otherwise) suffered by Buyer if complete, acceptable Goods are not delivered on time. Accordingly, instead of requiring any such proof, Buyer and Seller agree that as liquidated damages for delay (but not as a penalty) Seller shall pay Buyer **$1,000** for each day that expires after the time specified in Paragraph 2.02 for delivery of acceptable Goods or providing proof to the Buyer that the Pump Station is ready for shipment.

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ARTICLE 3—PROCUREMENT CONTRACT PRICE

3.01 *Procurement Contract Price and Total Price*

A. The Procurement Contract Price is comprised of the Lump Sum and Unit Price amounts set forth in the following paragraphs.

B. Buyer shall pay Seller a Lump Sum of $**[amount]** for furnishing the Goods and Special Services (other than any Unit Price Goods and Special Services) in accordance with the Procurement Contract Documents. Such Lump Sum amount accounts for the following Buyer-accepted alternates: **[identify accepted alternates, if any]**

C. The Total Price is $**[amount]**. Such Total Price is comprised of the Lump Sum amount (taking into account any accepted alternates), Unit Price Goods and Special Services amount (if any) (subject to final adjustment), and Buyer's Contingency Allowance (if any) (subject to final adjustment).

3.02 *Procurement Contract Price and Total Price—Based on Attached Bid*

A. For furnishing the Goods and Special Services in accordance with the Procurement Contract Documents, Buyer shall pay Seller the prices stated in Seller's Bid, attached hereto as an exhibit, subject to final adjustments for Unit Price Goods and Special Services and Buyer's Contingency Allowance, if any, and subject to the following Buyer-accepted alternates: **[identify accepted alternates, if any]**.

ARTICLE 4—PAYMENT PROCEDURES

4.01 *Submittal and Processing of Applications for Payment*

A. Seller shall submit Applications for Payment in accordance with Article 13 of the General Conditions and the following paragraphs. Engineer and Buyer will process such Applications for Payment in accordance with said Article 13.

4.02 *Progress Payments; Final Payment*

A. Seller may submit an Application for Payment requesting the stated percentage of Procurement Contract Price upon attainment of each of the following Payment Line Items:

Payment Line Item (Lump Sum)	Percentage of Lump Sum
1. **[Receipt of Approval of Shop Drawings and Samples]**	**[10]**
2. **[Completion of acceptable factory testing (if any)]**	**[5]**
3. **[Delivery of Goods to Point of Destination in accordance with the Procurement Contract Documents or proof the Pump Station is ready for shipment.]**	**[80]**
4. Final Payment: **[Correction of non-conformities, provision of final Operations and Maintenance manuals, submittal of warranties and other final documentation required by the Procurement Contract Documents]**	**[5]**
Total Procurement Contract Price (Lump Sum)	100

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B. For Unit Price Goods and Special Services, if any, or for payments owed to Seller as a result of authorizations by Buyer under the Buyer's Contingency Allowance (if any), Seller shall submit a separate Application for Payment, no more frequently than monthly, that states (1) the actual quantities of such Unit Price Goods and Special Services that have been furnished, and the applicable unit prices; and (2) the services or items performed or furnished under the Buyer's Contingency Allowance, and the amounts owed. If practical, and at Seller's option, Seller may apply for such unit price and Buyer's Contingency Allowance payments in a separate section of an Application for Payment submitted under Paragraph 4.02.A for lump sum items.

C. Buyer shall pay Seller the amount owed under an Application for Payment within 30 days after Engineer's presentation to Buyer of the Application for Payment and Engineer's recommendation.

4.03 *Interest*

A. All amounts not paid when due will bear interest as the rate of **[insert number]** percent per annum.

ARTICLE 5—ASSIGNMENT OF PROCUREMENT CONTRACT

5.01 *Assignment of Contract*

A. Buyer has the right to assign this Procurement Contract for furnishing Goods and Special Services, but only to a person or entity with sufficient apparent ability to satisfy all of Buyer's obligations under this Procurement Contract, and Seller hereby consents to such assignment. Forms documenting the assignment of the Procurement Contract, and consent of Seller's surety to the assignment, have been executed by Buyer, Seller, and Seller's surety, and are attached as exhibits to this Procurement Agreement. If so, assigned the following provisions apply:

1. The Procurement Contract is initially executed in the name of the entity identified herein as Buyer, and will be assigned by such Buyer (as assignor) to a construction contractor (Contractor/Assignee) designated by such Buyer. The assignment will occur on the effective date of the construction contract between such Buyer (Project Owner) and the Contractor/Assignee, which is expected to occur on or about **[insert date, or number of days from Procurement Contract's Effective Date]**. Commencing on the date of acceptance of assignment by the Contractor/Assignee, all references in the Procurement Contract to "Buyer" shall mean the designated Contractor/Assignee.

2. The assignment of this Procurement Contract relieves the assignor from all further obligations and liabilities under this Procurement Contract. After assignment, Seller shall become a subcontractor or supplier to the Contractor/Assignee and, except as noted herein, all rights, duties, and obligations of Buyer under the Procurement Contract become the rights, duties, and obligations of the Contractor/Assignee.

3. After assignment:

    a. The Procurement Drawings and Procurement Specifications, and any modifying Addenda will become "Contract Documents" under the construction contract.

    b. If the Procurement Drawings or Procurement Specifications, as "Contract Documents" under the construction contract, are duly modified under such

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construction contract, then Seller and Contractor/Assignee shall enter into a corresponding Change Order under the applicable provisions of this Procurement Contract.

c. The Procurement Drawings and Procurement Specifications may not be modified by Seller or Contractor/Assignee, singly or in tandem, except as such Procurement Drawings or Procurement Specifications, as "Contract Documents" under the construction contract, have been duly modified under such construction contract.

d. All performance warranties, guarantees, and indemnifications required by the Procurement Contract will continue to run for the benefit of assignor (Project Owner) and, in addition, for the benefit of the Contractor/Assignee. However, if assignor (Project Owner) and Contractor/Assignee make the same warranty or guarantee claim, then Seller shall only be liable once for such claim. Other than its remedies under such warranties, guarantees, and indemnifications, assignor will not retain direct rights under this Procurement Contract, but will have rights and remedies as a party to the construction contract, whose scope of work will encompass the Procurement Drawings, Procurement Specifications, and modifying Addenda; provided, however, that any limitations on Seller's liability in this Procurement Contract will continue to bind the original Buyer (assignor) after assignment.

e. The Contractor/Assignee shall have all the rights of the Buyer under the Performance Bond and Payment Bond.

f. Seller shall submit all Applications for Payment directly to Contractor/Assignee.

    1) Contractor/Assignee shall review each Application for Payment promptly, determine the amount that Contractor/Assignee approves for payment, and then include the amount approved in the next application for payment submitted to Project Owner (or Engineer) under the construction contract.

    2) Contractor/Assignee shall pay Seller within **[number]** days of receipt of payment from the Project Owner under the construction contract.

    3) After assignment Engineer will review, approve, or deny the content of Applications for Payment under the Procurement Contract only to the extent that Contractor/Assignee, as construction contractor, has incorporated such content into payment applications that Engineer reviews under the construction contract.

g. The Contractor/Assignee shall have all the rights of the Buyer under any pending Claim by Buyer.

h. All Claims and supporting documentation will be submitted directly by the claimant party (either Buyer **[Contractor/Assignee]** or Seller), to the other party, without submittal to Engineer.

    1) The other party will render a response in writing within 30 days of receipt of the last submittal of claimant.

    2) If the other party does not render a written response to a Claim within 30 days after receipt of the last submittal of the claimant, the other party shall be deemed to have approved the Claim in its entirety.

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3) The other party's written response to a Claim, or the approval of the Claim in its entirety as a function of failure to respond within 30 days, will be final and binding upon Buyer and Seller 30 days after it is issued, unless within such 30 days of issuance either Buyer or Seller appeals the result by initiating the mediation of the Claim in accordance with the dispute resolution procedures set forth in Paragraph 12.02 of the General Conditions.

4) Any Claim by Seller that Contractor/Assignee may choose to submit, present, or forward to Project Owner must be submitted to Buyer within sufficient time for Contractor/Assignee to preserve its rights under the construction contract, notwithstanding any procedures or time limits in this Procurement Contract.

i. Seller's recovery of additional cost, time, or both cost and time for any Claim attributable to the Project Owner will be limited to the proportionate recovery by Contractor/Assignee against Project Owner for such Claim. Seller will cooperate and assist Contractor/Assignee in pursuing any Claim by Contractor/Assignee against Project Owner on behalf of Seller, including the timely preparation and delivery of supporting documentation.

j. If the pursuit of any claim by Contractor/Assignee against Project Owner on Seller's behalf requires the expenditure by Contractor/Assignee of legal or consulting fees, or results in litigation, arbitration, or any dispute resolution procedures, Seller agrees to pay for a proportionate share of attorneys' fees, consultant fees, and litigation, arbitration, and other resolution costs incurred by Contractor/Assignee in pursuing the claim on behalf of Seller, based upon the amount claimed by Seller as compared to the total value of the claim pursued by the Contractor/Assignee.

k. All rights, duties, and obligations of Engineer to Contractor/Assignee and Seller under this Procurement Contract will cease.

l. Subject to the foregoing provisions, all references in the Procurement Contract to submitting items to Engineer, or to Engineer having tasks or obligations, will be read after such an assignment as requiring submittal to Contractor/Assignee, or as Contractor/Assignee having such tasks or obligations (which Contractor/Assignee may delegate when appropriate).

m. If the Procurement Contract includes a Buyer's Contingency Allowance, upon assignment such allowance will be automatically reduced to the amount previously authorized by Buyer (Project Owner), and cease to be operational.

B. No other assignment by a party hereto of any rights under or interests in the Procurement Contract will be binding on another party hereto without the written consent of the party sought to be bound. Specifically, but without limitation, Procurement Contract payments or other money that may become due, and Procurement Contract payments or other money that are due, may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by Laws and Regulations). Unless specifically stated to the contrary in any written consent to such an assignment, such an assignment will not release or discharge the assignor from any duty or responsibility under the Procurement Contract Documents.

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ARTICLE 6—PROCUREMENT CONTRACT DOCUMENTS

6.01 *List of Procurement Contract Documents*

A. The Procurement Contract Documents consist of the following:

1. This Procurement Agreement.
2. General Conditions of the Procurement Contract.
3. Supplementary Conditions of the Procurement Contract.
4. Procurement Specifications as listed in the Procurement Specifications table of contents **[copy of list attached]**.
5. Procurement Drawings (not attached but incorporated by reference):
    a. consisting of a cover sheet and sheets numbered **[number]** through **[number]**, inclusive, with each sheet bearing the following general title: **[Title]**.
    b. **[listed on the attached sheet index.]**
6. Addenda Numbers **[list those Addenda that are Procurement Contract Documents]**.
7. Bonds:
    a. Performance bond (together with power of attorney).
    b. Payment bond (together with power of attorney).
8. Exhibits to this Procurement Agreement (enumerated as follows):
    a. Exhibit A, Assignment of Contract, Consent to Assignment, and Acceptance of Assignment.
    b. Exhibit B, Surety's Consent to Assignment.
    c. Documentation submitted by Seller **[identify]**; and
    d. **[Other Exhibits]**.
9. The following which may be delivered or issued on or after the Effective Date of the Procurement Contract and are not attached hereto:
    a. Change Orders;
    b. Change Directives; and
    c. Field Orders.

B. The documents listed in Paragraph 6.01.A are attached to this Procurement Agreement (except as expressly noted otherwise above).

C. There are no Procurement Contract Documents other than those listed above.

D. The Procurement Contract Documents may only be amended or supplemented as provided in Paragraph 11.01 of the Procurement General Conditions.

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ARTICLE 7—SELLER'S REPRESENTATIONS AND CERTIFICATIONS

7.01 *Seller's Representations*

A. In order to induce Buyer to enter into this Procurement Agreement, Seller makes the following representations:

1. Seller has examined and carefully studied the Procurement Contract Documents.

2. If required by the Instructions to Bidders to visit the Point of Destination and the site where the Goods are to be installed or Special Services will be provided, or if, in Seller's judgment, any observable local or site conditions may affect the delivery, cost, progress, or furnishing of the Goods and Special Services, then Seller has visited the Point of Destination and site where the Goods are to be installed or Special Services will be provided (as applicable) and become familiar with and is satisfied as to the observable local and site conditions that may affect delivery, cost, progress, and furnishing of the Goods and Special Services.

3. Seller is familiar with and is satisfied as to all Laws and Regulations that may affect the cost, progress, and performance of Seller's obligations under the Procurement Contract.

4. Seller has carefully studied, considered, and correlated the information known to Seller with respect to the effect of such information on the cost, progress, and performance of Seller's obligations under the Procurement Contract.

5. Seller has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Seller has discovered in the Procurement Contract Documents, and the written resolution (if any) thereof by Engineer is acceptable to Seller.

6. The Procurement Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance of Seller's obligations under the Procurement Contract.

7. Seller's entry into this Procurement Contract constitutes an incontrovertible representation by Seller that without exception all prices in the Procurement Agreement are premised upon furnishing the Goods and Special Services as required by the Procurement Contract Documents.

7.02 *Seller's Certifications*

A. Seller certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Procurement Contract. For the purposes of this Paragraph 7.02:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Procurement Contract execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Procurement Contract to the detriment of Buyer, (b) to establish bid or contract prices at artificial non-competitive levels, or (c) to deprive Buyer of the benefits of free and open competition;

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3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Buyer, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Procurement Contract.

ARTICLE 8—CONFIDENTIALITY

8.01 *Confidential Information*

A. Confidential information is information in documents submitted by Seller that Seller clearly and prominently labels in writing to be a trade secret, proprietary, or confidential. Such documents, if any, will be maintained in a manner that endeavors to avoid disclosing confidential information to third parties, to the extent allowed by Laws and Regulations.

B. Seller shall clearly and prominently mark confidential information with the word "CONFIDENTIAL" on each page or sheet or on the cover of bound documents. Place "CONFIDENTIAL" stamps or watermarks so that they do not obscure any of the required information on the document, either in the original or in a way that would obscure any of the required information in a photocopy of the document.

8.02 *Disclosure of Confidential Information*

A. If Buyer is requested to disclose confidential information, or becomes legally compelled (by oral questions, interrogatories, requests for information or documents, subpoena, civil or criminal investigative demand, public information requests, or other requests under Laws and Regulations) to disclose confidential information, or is required by a regulatory body, governing agency, or controlling authority to disclose confidential information, or make any other disclosure that is prohibited or otherwise constrained by the Procurement Contract, Buyer will provide Seller with prompt notice so Seller may seek an appropriate protective order or other remedy. Seller will be solely responsible for submitting to the regulatory body, governing agency, or controlling authority any arguments, briefs, memoranda, motions, authorities, or other information in opposition to disclosure.

B. Buyer's obligations with respect to confidential information are nullified by the following exceptions:

1. Confidential information becomes a part of the public domain through publication or otherwise, through no fault of the Buyer;

2. Buyer can demonstrate through suitable documentation that the confidential information was already in the Buyer's possession, and not previously marked as confidential, or was otherwise publicly available prior to the Effective Date of the Procurement Contract;

3. The confidential information is subsequently and independently disclosed to the Buyer by a third party who has a lawful right to disclose such information;

4. Buyer has a good faith belief that disclosure is required or justified; or

5. Buyer is required to disclose the confidential information by court order or by applicable Laws and Regulations.

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8.03 *Waiver of Immunity*

A. Notwithstanding any other provision of the Procurement Contract, it is stipulated and agreed that by accepting confidential information, Buyer has not and does not waive its legal immunity (if any) from suit or liability.

ARTICLE 9—MUTUAL WAIVER

9.01 *Mutual Waiver of Consequential Damages*

A. Buyer and Seller waive against each other, and against the other's officers, directors, members, partners, employees, agents, consultants, and subcontractors, any and all claims for or entitlement to incidental, indirect, or consequential damages arising out of, resulting from, or related to the Procurement Contract. If Buyer (Project Owner) assigns this Procurement Contract to a construction contractor (Contractor/Assignee), then the terms of this Paragraph 9.01.A will be binding upon the Contractor/Assignee with respect to Seller and assignor. The terms of this mutual waiver do not apply to or limit any claim by either Buyer or Seller against the other based on any of the following: (a) contribution or indemnification, (b) liquidated damages, (c) costs, losses, or damages attributable to personal or bodily injury, sickness, disease, or death, or to injury to or destruction of the tangible property of others, (d) intentional or reckless wrongful conduct, or (e) rights conferred by any bond provided by Seller under this Procurement Contract.

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IN WITNESS WHEREOF, Buyer and Seller have signed this Procurement Agreement. Counterparts have been delivered to Buyer and Seller.

The Effective Date of the Procurement Contract is **[date to be inserted at the time of execution]**.

Buyer	Seller
_____ *(typed or printed name of organization)*	_____ *(typed or printed name of organization)*
By: _____ *(individual's signature)*	By: _____ *(individual's signature)*
Date: _____ *(date signed)*	Date: _____ *(date signed)*
Name: _____ *(typed or printed)*	Name: _____ *(typed or printed)*
Title: _____ *(typed or printed)*	Title: _____ *(typed or printed)* *(If Seller is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)*
Attest: _____ *(individual's signature)*	Attest: _____ *(individual's signature)*
Title: _____ *(typed or printed)*	Title: _____ *(typed or printed)*
Address for giving notices:	Address for giving notices:
_____	_____
_____	_____
_____	_____
Designated Representative:	Designated Representative:
Name: _____ *(typed or printed)*	Name: _____ *(typed or printed)*
Title: _____ *(typed or printed)*	Title: _____ *(typed or printed)*
Address:	Address:
_____	_____
_____	_____
_____	_____
Phone: _____	Phone: _____
Email: _____	Email: _____
(If Buyer is a corporation, attach evidence of authority to sign. If Buyer is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)	

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EXHIBIT A—ASSIGNMENT OF PROCUREMENT CONTRACT, CONSENT TO ASSIGNMENT, AND ACCEPTANCE OF ASSIGNMENT

This assignment will be effective on the effective date of the construction contract between Buyer (as "Owner") and Contractor/Assignee (as "Contractor").

The Procurement Contract between the **City of Williston** ("Buyer") and **[insert name of Seller]** ("Seller") for furnishing Goods and Special Services entitled **Williston WRRF Reuse Pump Station** (Procurement Contract) is hereby assigned, transferred, and set over to Contractor/Assignee, as assignee, by Buyer, as assignor. Upon assignment the Contractor/Assignee shall have the duties, rights, and obligations of Buyer under the terms of the Procurement Contract, and will be responsible to Owner under the construction contract for the performance of obligations by Seller, which will become a Subcontractor or Supplier to Contractor/Assignee. Buyer, Seller, and Contractor/Assignee hereby acknowledge and agree to be bound by the terms and conditions of assignment set forth in Article 5 of the Agreement Between Buyer and Seller for Procurement Contract.

Assignment Made by Buyer

_____
(typed or printed name of organization)

By: _____ Date: _____
(individual's signature) *(date signed)*

Name: _____ Title: _____
(typed or printed) *(typed or printed)*

If Buyer is a corporation, attach evidence of authority to sign. If Buyer is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of Buyer-Seller Agreement.

Assignment Acknowledged and Accepted by Seller

_____
(typed or printed name of organization)

By: _____ Date: _____
(individual's signature) *(date signed)*

Name: _____ Title: _____
(typed or printed) *(typed or printed)*

If Seller is a corporation, attach evidence of authority to sign.

Assignment Accepted by Contractor/Assignee

_____
(typed or printed name of organization)

By: _____ Date: _____
(individual's signature) *(date signed)*

Name: _____ Title: _____
(typed or printed) *(typed or printed)*

If Contractor/Assignee is a corporation, attach evidence of authority to sign.

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EXHIBIT B—SURETY'S CONSENT TO ASSIGNMENT

Surety hereby acknowledges, agrees, and consents that the Procurement Contract for furnishing Goods and Special Services entitled **Williston WRRF Reuse Pump Station** by and between the **City of Williston** ("Buyer") and **[Name of Seller]** ("Seller") may be assigned, transferred, and set over to **[Name of Contractor/Assignee]** ("Contractor/Assignee"), in accordance with Article 5 and Exhibit A of the Agreement between Buyer and Seller for Procurement Contract.

Surety further agrees that, upon assignment of the Procurement Contract, the Contractor/Assignee shall have all the rights of the Buyer under the Procurement Performance Bond and Procurement Payment Bond.

Agreement to Assignment Acknowledged and Accepted by Surety

_____
(typed or printed name of organization)

By: _____ Date: _____
(individual's signature) *(date signed)*

Name: _____ Title: _____
(typed or printed) *(typed or printed)*

Attach Power of Attorney.

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PERFORMANCE BOND FOR PROCUREMENT CONTRACT

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PERFORMANCE BOND FOR PROCUREMENT CONTRACT

Seller Name: **[Full formal name of Seller]** Address *(principal place of business)*: **[Address of Seller's principal place of business]**	**Surety** Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Buyer Name: **City of Williston** Mailing address *(principal place of business)*: **Attn: City Auditor** **City of Williston** **PO Box 1306** **Williston, ND 58802 - 1306**	**Procurement Contract** Description *(name and location)*: **Williston WRRF Reuse Pump Station** **Williston, ND** Procurement Contract Price: **[Amount, from Proc. Contract]** Effective Date of Procurement Contract: **[Date, from Proc. Contract]**

Bond

Bond Amount: **[Amount]**

Date of Bond: **[Date]**

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

Modifications to this Bond form:

☐ None ☐ See Paragraph 15

Surety and Seller, 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.

Seller as Principal	Surety
_____ *(Full formal name of Seller)*	_____ *(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 Seller, Surety, Buyer, or other party is considered plural where applicable.

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

2. If the Seller performs the Procurement Contract, the Surety and the Seller 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 Buyer Default under the Procurement Contract, the Surety's obligation under this Bond will arise after:

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

    3.2. The Buyer declares a Seller Default, terminates the Procurement Contract, and notifies the Surety; and

    3.3. The Buyer has agreed to pay the Balance of the Procurement Contract Price in accordance with the terms of the Procurement Contract to the Surety or to a seller selected to perform the Procurement Contract.

4. Failure on the part of the Buyer 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 Buyer 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 Seller, with the consent of the Buyer, to perform and complete the Procurement Contract;

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

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

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

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

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5.4.2. Deny liability in whole or in part and notify the Buyer, 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 (7) days after receipt of an additional written notice from the Buyer to the Surety demanding that the Surety perform its obligations under this Bond, and the Buyer shall be entitled to enforce any remedy available to the Buyer. If the Surety proceeds as provided in Paragraph 5.4, and the Buyer refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Buyer shall be entitled to enforce any remedy available to the Buyer.

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

   7.1. the responsibilities of the Seller for correction of defective or non-conforming Goods and Special Services, and completion of the Procurement Contract;

   7.2. additional legal, design professional, and delay costs resulting from the Seller'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 Procurement Contract, actual damages caused by delayed performance or non-performance of the Seller.

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 Buyer or others for obligations of the Seller that are unrelated to the Procurement Contract, and the Balance of the Procurement 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 Buyer or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Procurement 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 where the Point of Destination is located and must be instituted within two years after a declaration of Seller Default, or within two years after the Seller 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 Buyer, or the Seller 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 of the Point of Destination, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted herefrom 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

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

14.2. *Buyer Default*—Failure of the Buyer, which has not been remedied or waived, to pay the Seller as required under the Procurement Contract or to perform and complete or comply with the other material terms of the Procurement Contract.

14.3. *Goods and Special Services*—The full scope of materials, equipment, other items, and services to be furnished by Seller, as defined in the Procurement Contract.

14.4. *Point of Destination*—The location where delivery of the Goods shall be made, as stated in the Procurement Contract.

14.5. *Procurement Contract*—The contractual agreement between the Buyer and Seller identified on the cover page, including all Procurement Contract Documents and changes made to the Procurement Contract.

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

14.7. *Procurement Contract Documents*—All the documents that comprise the contractual agreement between the Buyer and Seller.

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

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PAYMENT BOND FOR PROCUREMENT CONTRACT

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PAYMENT BOND FOR PROCUREMENT CONTRACT

Seller	**Surety**
Name: **[Full formal name of Seller]**	Name: **[Full formal name of Surety]**
Address *(principal place of business)*: **[Address of Seller's principal place of business]**	Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Buyer	**Procurement Contract**
Name: **City of Williston**	Description *(name and location)*: **Williston WRRF Reuse Pump Station Williston, ND**
Mailing address *(principal place of business)*: **Attn: City Auditor City of Williston PO Box 1306 Williston, ND 58802 - 1306**	Procurement Contract Price: **[Amount, from Proc. Contract]**
	Effective Date of Procurement Contract: **[Date, from Proc. Contract]**

Bond

Bond Amount: **[Amount]**

Date of Bond: **[Date]**

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

Modifications to this Bond form:

☐ None ☐ See Paragraph 17

Surety and Seller, 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.

Seller as Principal	Surety
_____ *(Full formal name of Seller)*	_____ *(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 Seller, Surety, Buyer, or other party is considered plural where applicable.

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

2. If the Seller promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Buyer 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 Procurement Contract, then the Surety and the Seller shall have no obligation under this Bond.

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

4. When the Buyer has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Buyer 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 Seller

        5.1.1. have furnished a written notice of non-payment to the Seller, 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 Seller 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 Buyer to the Seller, 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 Buyer, 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 Seller 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.

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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 Buyer to the Seller under the Procurement Contract will be used for the performance of the Procurement Contract and to satisfy claims, if any, under any procurement performance bond. By the Seller furnishing and the Buyer accepting this Bond, they agree that all funds earned by the Seller in the performance of the Procurement Contract are dedicated to satisfying obligations of the Seller and Surety under this Bond, subject to the Buyer's priority to use the funds for the completion of the Goods and Special Services.

10. The Surety shall not be liable to the Buyer, Claimants, or others for obligations of the Seller that are unrelated to the Procurement Contract. The Buyer 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 Procurement 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 Point of Destination 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 Procurement 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 Buyer, or the Seller 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 where the Point of Destination is located, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted herefrom 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 Seller and Buyer shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

    16.1. *Buyer Default*—Failure of the Buyer, which has not been remedied or waived, to pay the Seller as required under the Procurement Contract or to perform and complete or comply with the other material terms of the Procurement Contract.

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

        16.2.1. The name of the Claimant;

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

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

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

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

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

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

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

16.3. *Claimant*—An individual or entity having a direct contract with the Seller or with a subcontractor of the Seller to furnish labor, materials, or equipment for use in the performance of the Procurement 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 Point of Destination is located or where the Goods and Special Services are to be installed or furnished. 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 Procurement Contract, architectural and engineering services required for performance of the work of the Seller and the Seller'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.

16.4. *Goods and Special Services*—The full scope of materials, equipment, other items, and services to be furnished by Seller, as defined in the Procurement Contract.

16.5. *Point of Destination*—The location where delivery of the Goods shall be made, as stated in the Procurement Contract.

16.6. *Procurement Contract*—The contractual agreement between the Buyer and Seller identified on the cover page, including all Procurement Contract Documents and all changes made to the Procurement Contract.

16.7. *Procurement Contract Documents*—All the documents that comprise the contractual agreement between the Buyer and Seller.

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

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BUYER'S ACKNOWLEDGMENT OF RECEIPT OF GOODS

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BUYER'S ACKNOWLEDGMENT OF RECEIPT OF GOODS

Buyer:	City of Williston	Buyer's Project No.:	
Engineer:	AE2S	Engineer's Project No.:	P00581-2025-003
Seller:		Seller's Project No.:	
Project:	Williston WRRF Reuse Pump Station		
Contract Name:	Contract No. 1 – Procurement Bid		

This Buyer's Acknowledgment of Receipt of Goods (Acknowledgment) applies to:

☐ All Goods ☐ The following specified portions of the Goods: **[Specify]**

Date of delivery of the Goods to the Point of Destination: **[Date]**

Date of Buyer's visual inspection of the Goods: **[Date]**

Date of this Acknowledgment: **[Date]**

Buyer acknowledges:

1. The Goods to which this notice applies have been delivered to the Point of Destination.
2. Buyer has visually inspected such Goods pursuant to Paragraph 9.02.B.1 of the General Conditions of the Procurement Contract.
3. Based on the visual inspection, such Goods appear to comply with the requirements of the Procurement Contract Documents as to quantities and condition, subject to any exceptions and limitations in this Acknowledgment.
4. Such Goods are deemed received for purposes of Paragraph 9.02.B.2 of the General Conditions of the Procurement Contract.
5. Seller may submit its Application for Payment for the delivered Goods, subject to the terms of the Procurement Agreement.

Exceptions (if any) to this Acknowledgment: ☐ None ☐ As follows:

The responsibilities between Buyer and Seller for securing and storing the Goods, maintaining the Goods during storage, and for furnishing the Special Services, shall be as provided in the Procurement Contract.

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

[List, if any, or indicate None]

This Acknowledgment does not constitute an acceptance of any Goods not in conformance with the Procurement Contract Documents, nor is it a release of Seller's obligation to furnish all Goods and Special Services in accordance with the Procurement Contract.

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	Buyer	**Engineer, on behalf of Buyer**
By (signature):		
Name (Printed):		
Title:		
Date:		

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

BUYER'S NOTICE REGARDING CONFORMITY OF GOODS AND SPECIAL SERVICES

Prepared By

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ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

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BUYER'S NOTICE REGARDING CONFORMITY OF GOODS AND SPECIAL SERVICES

Buyer:	City of Williston	Buyer's Project No.:	
Engineer:	AE2S	Engineer's Project No.:	P00581-2025-003
Seller:		Seller's Project No.:	
Project:	Williston WRRF Reuse Pump Station		
Contract Name:	Contract No. 1 – Procurement Bid		
Notice Date:		Effective Date of the Procurement Contract:	

Buyer hereby gives notice to Seller that, to the best of Buyer's knowledge, information, and belief, the Goods and Special Services:

☐ Are in conformance with the Procurement Contract Documents. Upon Seller's submittal of its final Application for Payment in accordance with the Procurement Contract Documents, Seller will be eligible for final payment, except as expressly indicated in the Procurement Contract.

☐ Are nonconforming with the Procurement Contract Documents for the following reason(s):

1. **[List reason(s) and clearly cite contractual provisions and factual circumstances of each]**

Seller's Special Services were completed on: **[fill in date]**

Buyer has consulted with and received Engineer's recommendation on conformity of the Goods and Special Services.

This Buyer's Notice Regarding Conformity of Goods and Special Services (Notice) is made expressly subject to the following terms and conditions to which all who receive and rely on said Notice agree: **[Edit the following to suit the specific procurement]**

1. This Notice is expressly subject to the terms and conditions set forth in the Procurement Contract.
2. This Notice is not a guarantee or warranty of Seller's performance under the Procurement Contract, an acceptance of Goods and Special Services that are not in accordance with the related Procurement Contract Documents, including but not limited to nonconforming Goods and Special Services discovered after final inspection, nor an assumption of responsibility for any failure of Seller to furnish the Goods and Special Services thereunder in accordance with the Procurement Contract, or to otherwise comply with the Procurement Contract Documents or the terms of any special guarantees specified therein.
3. This Notice does not relieve Seller of any surviving obligations under the Procurement Contract and is subject to Buyer's reservations of rights with respect to completion and final payment.

Buyer

By (signature): _____ Name (Printed): _____

Date: _____ Title: _____

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CONDITIONS
OF THE CONTRACT

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

STANDARD GENERAL CONDITIONS OF THE PROCUREMENT CONTRACT

Prepared By

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STANDARD GENERAL CONDITIONS OF THE PROCUREMENT CONTRACT

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ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Whenever used in the Procurement Bidding Requirements or Procurement Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated, which are applicable to the singular or plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Procurement 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 Procurement Contract Documents.

2. *Application for Payment*—The document prepared by Seller, in a form acceptable to Buyer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Procurement Contract Documents.

3. *Bid*—An offer or proposal of a prospective Seller submitted on the prescribed form setting forth the prices for the Goods and Special Services to be provided.

4. *Bidder*—An individual or entity that, as a prospective Seller, submits a Bid to Buyer.

5. *Buyer*—The individual or entity purchasing the Goods and Special Services.

6. *Change Directive*—A written directive from Buyer to Seller issued on or after the Effective Date of the Procurement Contract, ordering an addition, deletion, or revision in the Goods and Special Services.

7. *Change Order*—A document which is signed by Seller and Buyer and authorizes an addition, deletion, or revision to the Procurement Contract Documents or an adjustment in the Procurement Contract Price or the Procurement Contract Times, issued on or after the Effective Date of the Procurement Contract. Change Orders may be the result of mutual agreement by Buyer and Seller, or of resolution of a Claim.

8. *Claim*—A demand or assertion by Buyer or Seller seeking an adjustment of Procurement Contract Price or Procurement Contract Times, or both, or other relief with respect to the terms of the Procurement Contract. A demand for money or services by a third party is not a Claim.

9. *Contractor/Assignee*—A construction contractor with which Project Owner enters into a construction contract, and to which Project Owner, as initial Buyer, assigns this Procurement Contract.

10. *Effective Date of the Procurement Contract*—The date indicated in the Procurement Agreement on which the Procurement Contract becomes effective.

11. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

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12. *Electronic Means*—Electronic mail (e-mail), upload/download from a secure Project website, or other communications methods that allow: the transmission or communication of Electronic Documents; the documentation of transmissions, including sending and receipt; printing of the transmitted Electronic Document by the recipient; the storage and archiving of the Electronic Document by sender and recipient; and the use by recipient of the Electronic Document for purposes permitted by this Procurement Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

13. *Engineer*—The individual or entity designated as such in the Procurement Agreement.

14. *Field Order*—A written order issued by Engineer which requires minor changes in the Goods or Special Services, but which does not involve a change in the Procurement Contract Price or Procurement Contract Times.

15. *Goods*—The tangible and movable personal property that is described in the Procurement Contract Documents, regardless of whether the property is to be later attached to realty.

16. *Goods and Special Services*—The full scope of materials, equipment, other items, and services to be furnished by Seller, including Goods, as defined herein, and Special Services, if any, as defined herein. This term refers to both the Goods and the Special Services, or to either the Goods or the Special Services, and to any portion of the Goods or the Special Services, as the context requires.

17. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

18. *Milestone*—A principal event specified in the Procurement Contract that Seller must attain by the date or within the number of days indicated, including but not limited to the delivery of the Goods and the furnishing of Special Services.

19. *Notice of Award*—The written notice, by Buyer to a Bidder, of Buyer's acceptance of the Bid.

20. *Point of Destination*—The specific address of the location where delivery of the Goods will be made, as stated in the Procurement Agreement.

21. *Procurement Agreement*—The written instrument, executed by Buyer and Seller, that sets forth the Procurement Contract Price and Procurement Contract Times, identifies the parties and the Engineer, and designates the specific items that are Procurement Contract Documents.

22. *Procurement Bidding Documents*—The Procurement Bidding Requirements and the proposed Procurement Contract Documents (including all Addenda).

23. *Procurement Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and Bid Form with any supplements.

24. *Procurement Contract*—The entire and integrated written agreement between Buyer and Seller concerning the Goods and Special Services.

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25. *Procurement Contract Documents*—Those items so designated in the Procurement Agreement, and which together comprise the Procurement Contract. Shop Drawings and other Seller submittals are not Procurement Contract Documents, even if accepted, reviewed, or approved by Engineer or Buyer.

26. *Procurement Contract Price*—The money that Buyer has agreed to pay Seller for furnishing the Goods and Special Services in accordance with the Procurement Contract Documents.

27. *Procurement Contract Times*—The times stated in the Procurement Agreement by which the Goods must be delivered, Special Services must be furnished, and other Milestones must be attained.

28. *Procurement Drawings*—That part of the Procurement Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Goods and Special Services to be furnished by Seller. Shop Drawings and other Seller submittals are not Procurement Drawings as so defined.

29. *Procurement Specifications*—That part of the Procurement Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the furnishing of the Goods and Special Services, and certain administrative requirements and procedural matters applicable thereto.

30. *Project*—The total undertaking to be accomplished for Project Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Goods and Special Services are a part.

31. *Project Owner*—The entity that has retained (or will retain) engineers, contractors, and others for the planning, study, design, construction, testing, commissioning, and start-up of facilities and improvements. As of the Effective Date of the Procurement Contract, the Project Owner is the Buyer.

32. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Goods and Special Services and which establish the standards by which such portion of the Goods and Special Services will be judged.

33. *Schedule of Submittals*—A schedule, prepared and maintained by Seller, of required Submittals and the time requirements for Engineer's review of the Submittals.

34. *Seller*—The individual or entity furnishing the Goods and Special Services.

35. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Seller and submitted by Seller to illustrate some portion of the Goods and Special Services. Shop Drawings, whether approved or not, are not Procurement Drawings and are not Procurement Contract Documents.

36. *Special Services*—Services to be performed by Seller (or its agents or subcontractors) in association with the Goods to be furnished by Seller, as required by the Procurement Contract Documents.

37. *Submittal*—A written or graphic document, prepared by or for Seller, which the Procurement Contract Documents require Seller to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals

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may include Shop Drawings and Samples; schedules; product data; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or site quality-control testing and inspections; warranties and certifications; suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; record documents; and other such documents required by the Procurement Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Procurement Contract Documents. Change proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

38. *Successful Bidder*—The Bidder whose Bid the Buyer accepts, and to which Buyer makes an award of the Procurement Contract.

39. *Supplementary Conditions*—The part of the Procurement Contract that amends or supplements these General Conditions.

40. *Unit Price Goods and Special Services*—Goods and Special Services to be paid for on the basis of unit prices (if any).

1.02 *Terminology*

A. The words and terms discussed in Paragraphs 1.02.B and 1.02.C are not defined, but have the indicated meanings when used in the Bidding Requirements or Procurement Contract Documents.

B. *Intent of Certain Terms or Adjectives*

1. The Procurement Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Goods and Special Services. It is intended that such exercise of professional judgment, action, or determination will be commercially reasonable and will be solely to evaluate, in general, the Goods and Special Services for compliance with the requirements of and information in the Procurement Contract Documents and conformance with the design concept of the completed Project as a functioning whole, as shown or indicated in the Procurement Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective will not be effective to assign to Engineer any duty or authority to supervise or direct the furnishing of Goods or Special Services or any duty or authority to undertake responsibility contrary to any other provision of the Procurement Contract Documents.

2. The word "non-conforming" when modifying the words "Goods and Special Services," "Goods," or "Special Services," refers to Goods and Special Services that are unsatisfactory, faulty, or deficient in that they:

a. do not conform to or comply with the requirements of the Procurement Contract Documents;

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

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c. in the case of Special Services, have not been completed.

3. The word “receipt” when referring to the Goods, means the physical taking and possession by the Buyer under the conditions specified in Paragraph 9.02.B.2.

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

5. The word "furnish," when used in connection with the Goods and Special Services means to supply and deliver said Goods to the Point of Destination (or some other specified location) and to perform said Special Services fully, all in accordance with the Procurement Contract Documents.

C. *Procurement Contract Price or Procurement Contract Times*: References to a change in “Procurement Contract Price or Procurement Contract Times” or “Procurement Contract Times or Procurement Contract Price” or similar, indicate that such change applies to (1) Procurement Contract Price, (2) Procurement Contract Times, or (3) both Procurement Contract Price and Procurement Contract Times, as warranted, even if the term “or both” is not expressed.

D. Unless stated otherwise in the Procurement Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Procurement Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Seller delivers the executed counterparts of the Procurement Agreement to Buyer, the Seller also shall deliver to Buyer the performance bond and payment bond (if the Procurement Contract requires Seller to furnish such bonds).

B. *Evidence of Seller’s Insurance*: When Seller delivers the signed counterparts of the Procurement Agreement to Buyer, the Seller also shall deliver to Buyer, with copies to each additional insured (as identified in the Procurement Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Seller in accordance with Article 5. Evidence of insurance to be obtained at a later date, such as insurance relating to transit or storage of the Goods, will be provided to Buyer at the time of such insurance is obtained.

C. *Evidence of Buyer’s Insurance*: After receipt of the signed counterparts of the Procurement Agreement and all required bonds and insurance documentation, Buyer shall promptly deliver to Seller, with copies to each additional insured (as identified in the Procurement Contract), certificates and other evidence of insurance (if any) required to be provided by Buyer.

2.02 *Copies of Documents*

A. Buyer shall furnish to Seller four printed copies of the Procurement Contract (including one fully executed counterpart of the Procurement Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

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2.03 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Procurement Contract, the Buyer, Seller, and Engineer may send, and shall accept, Electronic Documents transmitted by Electronic Means.

B. If the Procurement Contract does not establish protocols for Electronic Means, then Buyer, Seller, and Engineer shall jointly develop such protocols.

C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

2.04 *Preliminary Schedules*

A. Within 15 days after the Effective Date of the Procurement Contract, Seller shall submit to Buyer and Engineer for timely review:

1. a progress schedule of activities, consistent with the Procurement Contract Times, including at a minimum, Shop Drawing and Sample submittals, tests, and deliveries as required by the Procurement Contract Documents.

a. The progress schedule will be acceptable to Buyer and Engineer if it provides an orderly progression of the Submittals, tests, and deliveries to completion within the specified Milestones of the Procurement Contract Times.

b. Such acceptance will not impose on Buyer or Engineer responsibility for the progress schedule, for sequencing, scheduling, or progress of Seller's performance of its obligations under the Procurement Contract, nor interfere with or relieve Seller from Seller's full responsibility therefor.

c. Such acceptance will not be deemed as an acknowledgment of the reasonableness and attainability of the schedule.

2. a preliminary schedule of Submittals.

B. No progress payment will be made to Seller until an acceptable progress schedule and acceptable schedule of Submittals are submitted to Buyer and Engineer (and other conditions applicable to progress payments are met).

2.05 *Preliminary Conference*

A. Within 20 days after the Procurement Contract Times start to run, a conference attended by Seller, Buyer, Engineer and others as appropriate will be held to establish a working understanding among the parties as to the Goods and Special Services and to discuss the schedules referred to in Paragraph 2.04.A, procedures for handling Shop Drawings and other Submittals, processing Applications for Payment, and maintaining required records.

2.06 *Safety*

A. Buyer and Seller shall comply with all applicable Laws and Regulations relating to the safety of persons or property, and to the protection of persons or property from damage, injury, or loss.

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B. When Seller's personnel, or the personnel of any subcontractor to Seller, are present at the Point of Destination or any work area or site controlled by Buyer, the Seller shall be responsible for the compliance by such personnel with any applicable requirements of Buyer's safety programs that are made known to Seller.

C. If Buyer or its representatives visit the Seller's manufacturing or storage facilities, for testing, inspection, or other purposes, Seller shall inform Buyer in advance of any safety preparations, standards, or programs with which Buyer and its representatives must comply.

ARTICLE 3—PROCUREMENT CONTRACT DOCUMENTS

3.01 *Intent*

A. The Procurement Contract Documents are complementary; what is called for by one is as binding as if called for by all.

B. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Procurement Contract Documents or from prevailing custom or trade usage as being required to produce or furnish the indicated Goods and Special Services will be provided, whether or not specifically called for, at no additional cost to Buyer.

C. Unless otherwise stated in the Procurement Contract Documents, if there is a discrepancy between the electronic or digital versions of the Procurement Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version will govern.

D. The Procurement Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Procurement Contract Documents, as provided in Paragraph 3.04.

F. Any provision or part of the Procurement Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Buyer and Seller.

3.02 *Reference Standards*

A. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws and Regulations, whether such reference be specific or by implication, means the standard, specification, manual, code, or Laws and Regulations in effect at the time of opening of Bids (or on the Effective Date of the Procurement Agreement if there were no Bids), except as may be otherwise specifically stated in the Procurement Contract Documents.

B. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a supplier, will be effective to change the duties or responsibilities of Buyer, Seller, or Engineer from those set forth in the part of the Procurement Contract Documents prepared by or for Engineer. No such provision or instruction will be effective to assign to Buyer or Engineer any duty or authority to supervise or direct the performance of Seller's obligations, or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Procurement Contract Documents prepared by or for Engineer.

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3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Seller's Review of Procurement Contract Documents*: If, before or during the performance of Seller's obligations, Seller discovers any conflict, error, ambiguity, or discrepancy within the Procurement Contract Documents, or between the Procurement Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any supplier to Seller, then Seller shall promptly report it to Engineer (or if the Procurement Contract is assigned, then directly to Contractor/Assignee) in writing. Seller shall not proceed with the Goods and Special Services affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer (or if the Procurement Contract is assigned, then by Contractor/Assignee) or by an amendment or supplement to the Procurement Contract Documents issued pursuant to Article 11.

2. Seller shall not be liable to Buyer or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Procurement Contract Documents unless Seller had actual knowledge thereof.

B. *Resolving Discrepancies*: Except as may be otherwise specifically stated in the Procurement Contract Documents, the provisions of the Procurement Contract Documents will take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Procurement Contract Documents and:

1. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Procurement Contract Documents); or

2. the provisions of any Laws or Regulations applicable to the furnishing of the Goods and Special Services (unless such an interpretation of the provisions of the Procurement Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Procurement Drawings and Procurement Specifications*

A. During the performance of Seller's obligations and until final payment, Seller and Buyer shall submit to the Engineer all matters in question concerning the requirements of the Procurement Drawings and Procurement Specifications (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Goods and Special Services, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Procurement Drawings and Procurement Specifications, and judge of the acceptability of the Goods and Special Services thereunder.

1. After assignment (if any) Seller shall submit such matters directly to Contractor/Assignee for response or administration, and the Procurement Contract provisions in Paragraphs 3.04.B and C will not apply.

B. Engineer will issue with reasonable promptness a written clarification, interpretation, or decision on the issue submitted, and if necessary, initiate an amendment or supplement to the Procurement Drawings or Procurement Specifications. Engineer's written clarification, interpretation, or decision will be consistent with the overall intent of the Procurement Contract Documents, and will be final and binding on Seller and Buyer. If either Buyer or Seller believes that a written clarification or interpretation justifies an adjustment in the

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Procurement Contract Price or Procurement Contract Times, either may make a Claim for such adjustment as provided in Article 12.

C. If a submitted matter in question concerns terms and conditions of the Procurement Contract Documents that do not involve (1) the performance or acceptability of the Goods and Services, (2) the design (as set forth in the Procurement Drawings, Procurement Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Buyer and Seller that Engineer is unable to provide a decision or interpretation.

3.05 *Reuse of Documents*

A. Seller and its subcontractors and suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Procurement Drawings, Procurement Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Procurement Drawings, Procurement Specifications, other documents, or copies thereof, on extensions of the Project or any other project, without written consent of Buyer and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Procurement Contract Documents, reuse any such Procurement Contract Documents for any purpose without Buyer's express written consent, or violate any copyrights pertaining to such Procurement Contract Documents.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Procurement Contract. Nothing herein precludes Seller from retaining copies of the Procurement Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND SCHEDULE

4.01 *Commencement of Procurement Contract Times*

A. The Procurement Contract Times will commence to run on the Effective Date of the Procurement Contract.

4.02 *Continuing Performance*

A. Seller shall adhere to the progress schedule established in accordance with Paragraph 2.04.A., as duly adjusted, and the Goods will be delivered and the Special Services furnished within the Procurement Contract Times.

B. Seller shall carry on furnishing of the Goods and Special Services and adhere to the progress schedule during all disputes or disagreements with Buyer. No furnishing of Goods and Special Services will be delayed or postponed pending resolution of any disputes or disagreements, except as expressly permitted herein, or as Buyer and Seller may otherwise agree in writing.

4.03 *Adjustments to Progress Schedule*

A. The progress schedule established in accordance with Paragraph 2.04 may be adjusted from time to time as provided below.

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1. Seller shall submit to Buyer for acceptance (to the extent indicated in Paragraph 2.04) proposed adjustments in the progress schedule that will not result in changing the Procurement Contract Times. Such adjustments will comply with any applicable provisions of the Procurement Specifications.

2. Proposed adjustments in the progress schedule that will change the Procurement Contract Times must be submitted in accordance with the requirements of Article 11. Adjustments in Procurement Contract Times may only be made by a Change Order.

4.04 *Delays*

A. If Buyer, Engineer, or anyone for whom Buyer is responsible, delays, disrupts, or interferes with Seller's performance or progress, then Seller shall be entitled to an equitable adjustment in Procurement Contract Price or Procurement Contract Times.

B. Seller shall not be entitled to an adjustment in Procurement Contract Price or Procurement Contract Times for delay, disruption, or interference caused by or within the control of Seller or anyone for whom Seller is responsible.

C. If Seller's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Buyer, Seller, and those for which they are responsible, then Seller shall be entitled to an equitable adjustment in Procurement Contract Times. Such an adjustment will be Seller's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Procurement Contract Times under this paragraph include but are not limited to the following:

1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. abnormal weather conditions;

3. inspection delays by governmental authorities, and custom delays;

4. international shipping delays;

5. acts or failures to act of third-party entities; and

6. acts of war or terrorism.

D. *Adjustments of Procurement Contract Times or Procurement Contract Price—General Provisions*: Seller's entitlement to an adjustment of Procurement Contract Times or Procurement Contract Price is limited as follows:

1. Seller's entitlement to an adjustment of the Procurement Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of Seller's obligations, as of the time of the delay, disruption, or interference.

2. Seller shall not be entitled to an adjustment in Procurement Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Seller. Such a concurrent delay by Seller does not preclude an adjustment of Procurement Contract Times to which Seller is otherwise entitled.

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3. Adjustments of Procurement Contract Times or Procurement Contract Price are subject to the provisions of Articles 11 and 12.

E. Each Seller request seeking a delay-related increase in Procurement Contract Times or Procurement Contract Price must be supplemented by supporting data that sets forth in detail the following: (1) the circumstances that form the basis for the requested adjustment; (2) the date upon which each cause of delay, disruption, or interference began to affect Seller's progress; (3) the date upon which each cause of delay, disruption, or interference ceased to affect Seller's progress; (4) the number of days' increase in Procurement Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and (5) the impact on Procurement Contract Price. Seller shall also furnish such additional supporting documentation as Buyer or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion.

ARTICLE 5—BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Seller shall furnish a performance bond and a payment bond, each in an amount at least equal to the Procurement Contract Price, as security for the faithful performance and payment of Seller's obligations under the Procurement Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 9.04, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Procurement Contract.

B. Seller shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Procurement Contract.

C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Buyer prior to execution of the Procurement Contract, except as provided otherwise by Laws or Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

D. Seller shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.

E. If the surety on a bond furnished by Seller is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Seller shall promptly notify Buyer and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements of this Procurement Contract.

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F. If Seller has failed to obtain a required bond, Buyer may exercise Buyer's termination rights under Article 14.

G. Upon request to Buyer from any subcontractor, supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of Seller's obligations, Buyer shall provide a copy of the payment bond to such person or entity.

H. Upon request to Seller from any subcontractor, supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of Seller's obligations, Seller shall provide a copy of the payment bond to such person or entity.

5.02 *Insurance*

A. Seller shall provide insurance of the types and coverages and in the amounts stipulated in the Supplementary Conditions.

B. Failure of Buyer to demand certificates of insurance or other evidence of Seller's full compliance with these insurance requirements or failure of Buyer to identify a deficiency in compliance from the evidence provided will not be construed as a waiver of Seller's obligation to maintain such insurance.

C. Upon assignment of this Procurement Contract, Seller shall name the Contractor/Assignee as an additional insured and comply with the written request of Contractor/Assignee to provide evidence of insurance.

D. Buyer does not represent that insurance coverage and limits established in this Procurement Contract necessarily will be adequate to protect Seller.

E. The insurance and insurance limits required herein will not be deemed as a limitation on Seller's liability under the indemnities and other rights granted to Buyer in the Procurement Contract.

5.03 *Surety or Insurance Companies*

A. All bonds and insurance required by the Procurement Contract Documents to be purchased and maintained by Buyer or Seller shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies must also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

ARTICLE 6—LICENSES AND FEES

6.01 *Intellectual Property and License Fees*

A. Except to the extent stated elsewhere in the Procurement Contract Documents, Seller is not transferring any patent rights, copyrights, or other intellectual property rights for the Goods delivered.

B. To the extent Seller is manufacturing to Buyer's design, Buyer retains all patent rights, copyrights, and other intellectual property rights in such design.

C. If an invention, design, process, product, or device is specified in the Procurement Contract Documents for incorporation in the Goods or for the performance of Special Services, and if, to the actual knowledge of Buyer or Engineer, its use is subject to patent rights, copyrights,

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or other intellectual property rights calling for the payment of a license fee or royalty to others, then the existence of such rights and payment obligations will be disclosed to Seller in the Procurement Contract Documents.

D. Seller shall pay all license fees and royalties and assume all costs incident to the use or the furnishing of the Goods, unless specified otherwise by the Procurement Contract Documents.

6.02 *Seller's Infringement*

A. Subject to Paragraph 6.01, to the fullest extent permitted by Laws and Regulations, Seller shall indemnify and hold harmless Buyer, Engineer, and their officers, directors, members, partners, employees, agents, consultants, contractors, and subcontractors, from and against all claims, costs, losses, damages, and judgments (including but not limited to all reasonable fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement or alleged infringement of any patent, copyright, or other intellectual property right by any of the Goods as delivered or Special Services as performed.

B. Buyer will promptly notify Seller in writing of any claim, suit, or threat of suit by a third party for any infringement or alleged infringement of any patent, copyright, or other intellectual property right with respect to the Goods as delivered or Special Services as performed.

C. Seller shall promptly defend or settle the claim or suit. Seller shall have control over such claim or suit, bear all expenses, and satisfy any adverse judgment.

1. If Seller fails to defend such suit or claim after written notice by Buyer, Seller will be bound, in any subsequent suit or claim against Seller by Buyer, by any factual determination in the prior suit or claim.

2. If Buyer fails to provide Seller the opportunity to defend such suit or claim, Buyer shall be barred from any remedy against Seller for such suit or claim.

D. If a determination is made that Seller has infringed upon the intellectual property rights of another, Seller may, at Seller's own expense, obtain the necessary licenses for Buyer's benefit, or replace the Goods and provide related design and construction, consistent with the requirements of the Procurement Contract Documents, to avoid the infringement.

6.03 *Buyer's Infringement*

A. Subject to Paragraph 6.01, and to the fullest extent permitted by Laws and Regulations, Buyer shall be responsible to Seller for any infringement or alleged infringement of any patent, copyright, or other intellectual property right caused by Seller's compliance with the Procurement Drawings or Procurement Specifications, and will reimburse Seller for any license fee or royalties paid by Seller to others if such payment resulted from any invention, design, process, product, or device specified to be furnished or performed in the Procurement Drawings or Procurement Specifications, but not identified as being subject to payment of such license fee or royalty.

B. Seller will promptly notify Buyer in writing of any claim, suit, or threat of suit by a third party for intellectual property infringement arising from Seller's compliance with the Procurement Drawings or Procurement Specifications.

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C. Buyer shall defend or settle the claim or suit. Buyer shall have control over such claim or suit, bear all expenses, and satisfy any adverse judgment.

1. If Buyer fails to defend such suit or claim after written notice by Seller, Buyer will be bound, in any subsequent suit or claim against Buyer by Seller, by any factual determination in the prior suit or claim.

2. If Seller fails to provide Buyer the opportunity to defend such suit or claim, Seller shall be barred from any remedy against Buyer for such suit or claim.

ARTICLE 7—SELLER'S RESPONSIBILITIES

7.01 *Performance of Obligations*

A. Seller shall be solely responsible for the means, methods, techniques, sequences, and procedures necessary to perform its obligations in accordance with the Procurement Contract Documents.

B. Seller shall supervise, inspect, and direct the furnishing of the Goods and Special Services competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform its obligations in accordance with the Procurement Contract Documents.

C. Seller shall coordinate the provision of Special Services to avoid or limit interference or disruption of other activities at the location where the Special Services are to occur, including but not limited to ongoing facility operations and construction activities.

7.02 *Labor, Materials and Equipment*

A. Seller shall provide competent, qualified and trained personnel in all aspects of its performance of the Procurement Contract.

B. All Goods, and all equipment and material incorporated into the Goods, must be as specified, and unless specified otherwise in the Procurement Contract Documents, must be:

1. new, and of good quality;

2. protected, assembled, connected, cleaned, and conditioned in accordance with the original manufacturer's instructions; and

3. shop-assembled to the greatest extent practicable.

7.03 *Laws and Regulations*

A. Seller shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of its obligations in accordance with the Procurement Contract Documents. Except where otherwise expressly required by such Laws and Regulations, neither Buyer nor Engineer shall be responsible for monitoring Seller's compliance with any Laws or Regulations.

B. If Seller furnishes Goods and Special Services knowing or having reason to know that such furnishing is contrary to Laws or Regulations, Seller shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such performance. It will not be Seller's responsibility to make certain

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that the Procurement Specifications and Procurement Drawings are in accordance with Laws and Regulations, but this provision will not relieve Seller of Seller's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Procurement Contract if there were no Bids) that have a direct effect on the cost or time of Seller's performance will be the subject of an adjustment in Procurement Contract Price or Procurement Contract Times. If Buyer and Seller are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Article 12.

7.04 *"Or Equals"*

A. Whenever an item of material or equipment to be incorporated into the Goods is specified or described in the Procurement Contract Documents by using the names of one or more proprietary items or specific suppliers or manufacturers, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, other items of material or equipment or material or equipment of other suppliers or manufacturers may be submitted to Buyer for Engineer's review.

1. If in Engineer's sole discretion, such an item of material or equipment proposed by Seller is functionally equal to that named and sufficiently similar so that no change in related work will be required, it may be considered by Engineer as an "or equal" item.

2. For the purposes of this paragraph, a proposed item of material or equipment may be considered functionally equal to an item so named only if in the exercise of reasonable judgment, Engineer determines that: 1) it is at least equal in quality, durability, appearance, strength, and design characteristics; 2) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole; 3) it has an acceptable record of performance and availability of responsive service; and (4) Seller certifies that if approved: a) there will be no increase in any cost, including capital, installation or operating costs, to Buyer; and b) the proposed item will conform substantially to the detailed requirements of the item named in the Procurement Contract Documents.

B. *Engineer's Evaluation*: Engineer will be allowed a reasonable time within which to evaluate each proposal or Submittal made pursuant to Paragraph 7.04.A. Engineer will be the sole judge of whether to accept or reject such a proposal or Submittal. No "or equal" will be ordered, manufactured or utilized until Engineer's review is complete, which will be evidenced by an approved Shop Drawing. Engineer will advise Buyer and Seller in writing of any negative determination. Notwithstanding Engineer's approval of an "or-equal" item, Seller shall remain obligated to comply with the requirements of the Procurement Contract Documents.

C. *Special Guarantee*: Buyer may require Seller to furnish at Seller's expense a special performance guarantee or other surety with respect to any such proposed "or-equal."

D. *Data*: Seller shall provide all data in support of any such proposed "or equal" at Seller's expense.

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7.05 *Taxes*

A. Seller shall pay all taxes and duties arising out of the sale of the Goods and the performance of Special Services. All taxes and duties are included in the Procurement Contract Price, except as noted in the Supplementary Conditions.

7.06 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Seller shall:

a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Procurement Contract Documents;

b. determine and verify:

1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal; and

2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of Seller's obligations.

c. confirm that the Submittal is complete with respect to all related data included in the Submittal.

2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Seller has satisfied its obligations under the Procurement Contract Documents with respect to Seller's review of that Submittal, and that Seller approves the Submittal.

3. With each Shop Drawing or Sample, Seller shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Procurement Contract Documents. This notice will be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

B. *Submittal Procedures for Shop Drawings and Samples*: Seller shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.

1. *Shop Drawings*

a. Seller shall submit the number of copies required in the Procurement Specifications.

b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Seller proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.06.C.

2. *Samples*

a. Seller shall submit the number of Samples required in the Procurement Specifications.

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b. Seller shall clearly identify each Sample as to material, supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.06.C.

3. Where a Shop Drawing or Sample is required by the Procurement Contract Documents or the Schedule of Submittals, any related work performed by Seller prior to Engineer's review and approval of the pertinent Submittal will be at the sole expense and responsibility of Seller.

C. *Engineer's Review of Shop Drawings and Samples*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Goods, comply with the requirements of the Procurement Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Procurement Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, manufacturing, fabrication, installation, or shipping, or to safety precautions or programs incident thereto.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Seller from responsibility for any variation from the requirements of the Procurement Contract Documents unless Seller has complied with the requirements of Paragraph 7.06.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Procurement Contract Documents in a Field Order or other appropriate Procurement Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Seller from responsibility for complying with the requirements of Paragraphs 7.06.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Procurement Contract Documents, will not, under any circumstances, change the Procurement Contract Times or Procurement Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing or Sample will result in such item becoming a Procurement Contract Document.

8. Seller shall furnish Goods that comply with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.06.C.4.

D. *Resubmittal Procedures for Shop Drawings and Samples*

1. Seller 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

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and approval. Seller shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.

2. Seller shall furnish required Shop Drawing and Sample Submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Seller shall be responsible for Engineer's charges to Buyer for such time. Buyer may impose a set-off against payments due Seller to secure reimbursement for such charges.

3. If Seller requests a change of a previously approved Shop Drawing or Sample, Seller shall be responsible for Engineer's charges to Buyer for its review time, and Buyer may impose a set-off against payments due Seller to secure reimbursement for such charges, unless the need for such change is beyond the control of Seller.

E. *Submittals Other than Shop Drawings and Samples*

1. The following provisions apply to all Submittals other than Shop Drawings and Samples:

a. Seller shall submit all such Submittals to the Engineer in accordance with the schedule of Submittals and pursuant to the applicable terms of the Procurement Contract Documents.

b. Engineer will provide timely review of all such Submittals in accordance with the schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the schedule of Submittals will be deemed accepted.

c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Procurement Contract Documents as to general form and content of the Submittal.

d. If any such Submittal is not accepted, Seller shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.

2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.04 and 2.05.

7.07 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Seller shall indemnify and hold harmless Buyer, Engineer, Project Owner, and any assignee of Buyer, including Contractor/Assignee, and their officers, directors, members, partners, employees, agents, consultants, contractors, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of Seller's obligations under the Procurement Contract, 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 Goods themselves), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Seller, or any individual or entity directly or indirectly employed by Seller or anyone for whose acts Seller may be liable.

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B. In any and all claims against Buyer, Engineer, Project Owner, or any assignee of Buyer, including Contractor/Assignee, or their officers, directors, members, partners, employees, agents, consultants, contractors, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Seller, any subcontractor, any supplier, or any individual or entity directly or indirectly employed by any of them to furnish any of the Goods and Special Services, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.07.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Seller or any such subcontractor, supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.08 *Concerning Subcontractors and Suppliers*

A. Seller may retain subcontractors and suppliers for the performance of parts of the furnishing of the Goods and Special Services. The Seller's retention of a subcontractor or supplier will not relieve Seller's obligation to Buyer to perform and complete the furnishing the Goods and Special Services in accordance with the Procurement Contract Documents.

ARTICLE 8—SHIPPING AND DELIVERY

8.01 *Shipping*

A. Seller shall select the carrier and bear all costs of packaging, transportation, insurance, special handling, and all other costs associated with shipment and delivery.

8.02 *Delivery*

A. Seller shall deliver the Goods free on board (FOB) to the Point of Destination, freight prepaid, in accordance with the Procurement Contract Times set forth in the Procurement Agreement, or other date agreed to by Buyer and Seller.

B. At least 10 days before shipment, Seller shall provide written notice to Buyer of the manner of shipment and the anticipated delivery date. The notice must also include any instructions concerning special equipment or services required at the Point of Destination to unload and care for the Goods. Seller shall also require the carrier to give Buyer at least 24 hours' notice by telephone prior to the anticipated time of delivery.

C. Buyer will be responsible and bear all costs for unloading the Goods from carrier.

D. Buyer will assure that adequate facilities are available to receive delivery of the Goods at the time established for delivery, or on another date agreed to by Buyer and Seller.

E. No partial deliveries will be allowed, unless permitted or required by the Procurement Contract Documents or agreed to in writing by Buyer.

F. Provisions governing inspection on delivery are set forth in Paragraph 9.02.

8.03 *Risk of Loss*

A. Risk of loss and insurable interests transfer from Seller to Buyer upon Buyer's receipt of the Goods.

B. Notwithstanding the provisions of Paragraph 8.03.A, if Buyer rejects the Goods as non-conforming, the risk of loss on such Goods will remain with Seller until Seller corrects the non-conformity or Buyer accepts the Goods. If rejected Goods remain at the Point of

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Destination pending modification and acceptance, then Seller shall be responsible for arranging adequate protection and maintenance of the Goods at Seller's expense.

ARTICLE 9—BUYER'S RIGHTS

9.01 *Seller's Warranties and Guarantees*

A. Seller warrants and guarantees to Buyer that the title to the Goods conveyed will be proper, its transfer rightful, and free from any security interest, lien, or other encumbrance. Seller shall defend, indemnify, and hold Buyer harmless against any liens, claims, or demands contesting or affecting title of the Goods conveyed.

B. Seller warrants and guarantees to Buyer that all Goods and Special Services will conform with the Procurement Contract Documents, and with the standards established by any Samples approved by Engineer. Engineer shall be entitled to rely on Seller's warranty and guarantee. If the Procurement Contract Documents do not otherwise specify the characteristics or the quality of the Goods, the Goods must comply with the requirements of Paragraph 7.02.B.

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

1. abuse, improper modification, improper maintenance, or improper operation by persons other than Seller;

2. excessive corrosion or chemical attack, unless corrosive or chemically-damaging conditions were disclosed by Buyer in the Procurement Contract Documents and the Procurement Contract Documents required the Goods to withstand such conditions;

3. use in a manner contrary to Seller's written instructions for installation, operation, and maintenance; or

4. normal wear and tear under normal usage.

D. Seller's obligation to furnish the Goods and Special Services in accordance with the Procurement Contract Documents will be absolute. None of the following will constitute an acceptance of Goods and Special Services that are non-conforming, or a release of Seller's obligation to furnish the Goods and Special Services in accordance with the Procurement Contract Documents:

1. observations by Buyer, Engineer, or Project Owner;

2. recommendation by Engineer or payment by Buyer of any progress or final payment;

3. use of the Goods by Buyer or Project Owner;

4. any acceptance by Buyer, Engineer, or Project Owner, or any failure to do so;

5. the end of the correction period established in Paragraph 9.04;

6. the issuance of a notice of acceptance;

7. any inspection, test or approval by others; or

8. any correction of non-conforming Goods and Special Services by Buyer or Project Owner.

E. Buyer shall promptly notify Seller of any breach of Seller's warranties or guarantees.

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9.02 *Inspections and Testing*

A. *General Provisions*

1. The Procurement Contract Documents specify required inspections and tests. Buyer shall have the right to perform, or cause to be performed, reasonable inspections and require reasonable tests of the Goods at Seller's facility, and at the Point of Destination. Seller shall allow Buyer a reasonable time to perform such inspections or tests.

2. Seller shall reimburse Buyer for all expenses, except for travel, lodging, and subsistence expenses of Buyer's and Engineer's representatives, for inspections and tests specified in the Procurement Contract Documents. If as the result of any such specified testing the Goods are determined to be non-conforming, then Seller shall also bear the travel, lodging, and subsistence expenses of Buyer's and Engineer's representatives, and all expenses of re-inspection or retesting.

3. Buyer shall bear all expenses of inspections and tests that are not specified in the Procurement Contract Documents (other than any re-inspection or retesting resulting from a determination of non-conformity, as set forth in Paragraph 9.03); provided, however, that if as the result of any such non-specified inspections or testing the Goods are determined to be non-conforming, then Seller shall bear all expenses of such inspections and testing, and of any necessary re-inspection and retesting.

4. Seller shall provide Buyer timely written notice of the readiness of the Goods for all inspections, tests, or approvals which the Procurement Contract Documents specify are to be observed by Buyer prior to shipment.

5. Buyer will give Seller timely notice of all specified tests, inspections, and approvals of the Goods which are to be conducted at the Point of Destination, and a representative of Seller will attend such tests, inspections, and approvals.

6. If, on the basis of inspections or testing, the Goods appear to be conforming, Buyer will give Seller prompt notice thereof. If on the basis of inspections or testing, the Goods appear to be non-conforming, Buyer will give Seller prompt notice thereof and will advise Seller of the remedy Buyer elects under the provisions of Paragraph 9.03.

7. Neither payments made by Buyer to Seller prior to any tests or inspections, nor any tests or inspections, will constitute acceptance of non-conforming Goods, or prejudice Buyer's rights under the Procurement Contract.

B. *Visual Inspection on Delivery*

1. Buyer will visually inspect the Goods upon delivery solely for purposes of identifying the Goods, general verification of quantities, and observation of apparent condition. Such visual inspection will not be construed as final or as receipt of any Goods and Special Services that, as a result of subsequent inspections and tests, are determined to be non-conforming.

2. If, on the basis of the visual inspection specified in Paragraph 9.02.B.1, the Goods appear to comply with the requirements of the Procurement Contract Documents as to quantities and condition, then within 10 days of delivery Buyer shall issue to Seller Buyer's acknowledgment of the receipt of Goods.

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C. *Final Inspection*

1. After all of the Goods have been incorporated into the Project, tested in accordance with such testing requirements as are specified, and are functioning as required, and Seller has performed and completed all Special Services, Buyer will make a final inspection.

2. If, on the basis of the final inspection, Buyer determines that the Goods and Special Services are conforming, Buyer's notice thereof will constitute Buyer's acceptance of the Goods and Special Services, subject to any limitations stated in the notice.

3. If, on the basis of the final inspection, the Goods and Special Services are non-conforming, Buyer will identify the non-conformity in writing.

9.03 *Non-Conforming Goods and Special Services*

A. If, on the basis of inspections and testing prior to delivery, the Goods and Special Services are found to be non-conforming, or if at any time after Buyer has acknowledged receipt of delivery and before the expiration of the correction period described in Paragraph 9.04, Buyer determines that the Goods and Special Services are non-conforming, then Seller shall promptly, without cost to Buyer and in response to written instructions from Buyer, either correct such non-conforming Goods and Special Services, or, if Goods are rejected by Buyer, remove and replace the non-conforming Goods with conforming Goods, including all work required for reinstallation.

B. *Buyer's Rejection of Non-Conforming Goods*

1. If Buyer elects to reject the Goods in whole or in part, Buyer's notice to Seller will describe in sufficient detail the non-conforming aspect of the Goods. If Goods have been delivered to Buyer, Seller shall promptly, and within the Procurement Contract Times, remove and replace the rejected Goods.

2. Seller shall bear all costs, losses and damages attributable to the removal, replacement, reinspection, and retesting of the non-conforming Goods.

3. Upon rejection of the Goods, Buyer retains a security interest in the Goods to the extent of any payments made and expenses incurred in their testing and inspection.

C. *Buyer's Rejection of Non-Conforming Special Services*

1. If at any time Buyer elects to reject the Special Services in whole or in part, Buyer's notice to Seller will describe in sufficient detail the non-conforming aspect of the Special Services.

2. Seller shall promptly provide conforming Special Services acceptable to Buyer.

3. If Seller fails to provide conforming Special Services, Buyer may remove the Special Services from the scope of the Procurement Contract, and equitably reduce the Procurement Contract Price.

D. *Remedying Non-Conforming Goods*: If Buyer elects to permit the Seller to modify the Goods to correct the non-conformance, then Seller shall promptly provide a schedule for such modifications and shall make the Goods conforming within a reasonable time.

E. *Buyer's Acceptance of Non-Conforming Goods*: Instead of requiring correction or removal and replacement of non-conforming Goods discovered either before or after final payment,

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Buyer may accept the non-conforming Goods. Seller shall bear all reasonable costs, losses, and damages attributable to Buyer's evaluation of and determination to accept such non-conforming Goods.

F. *Seller Obligations*: Seller shall pay all claims, costs, losses, and damages, including but not limited to all fees and charges for re-inspection, retesting and for any engineers, architects, attorneys and other professionals, and all court or arbitration or other dispute resolution costs arising out of or relating to the non-conforming Goods and Special Services. Seller's obligations will include the costs of the correction or removal and replacement of the non-conforming Goods and the replacement of property of Buyer and others destroyed by the correction or removal and replacement of the non-conforming Goods, and obtaining conforming Special Services from others.

G. *Buyer's Rejection of Conforming Goods*: If Buyer asserts that Goods and Special Services are non-conforming and such Goods and Special Services are determined to be conforming, or if Buyer rejects as non-conforming Goods and Special Services that are later determined to be conforming, then Seller shall be entitled to reimbursement from Buyer of costs incurred by Seller in inspecting, testing, correcting, removing, or replacing the conforming Goods and Special Services, including but not limited to fees and charges of engineers, architects, attorneys and other professionals, and all court or arbitration or other dispute resolution costs associated with the incorrect assertion of non-conformance or rejection of conforming Goods and Special Services.

9.04 *Correction Period*

A. Seller's responsibility for correcting all non-conformities in the Goods and Special Services will extend for a period of one year after the acceptance of the Goods and Special Services in accordance with Paragraph 9.02.C.2.

B. Where non-conforming Goods and Services (and damage to other work resulting therefrom) have been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Goods and Services will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

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

ARTICLE 10—ENGINEER'S STATUS

10.01 *Engineer's Role Defined*

A. Engineer will be Buyer's representative until assignment (if any) of the Procurement Contract.

B. The duties and responsibilities and the limitations of authority of Engineer prior to assignment, if any, of the Procurement Contract, are set forth in the Procurement Contract Documents.

C. Engineer's responsibilities, if any, after an assignment (if any) of the Procurement Contract, are set forth in the Procurement Agreement.

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10.02 *Duties and Responsibilities; Authority; Limitations*

A. As set forth in Article 3, Engineer will be the initial interpreter of the Procurement Contract Documents and judge of the acceptability of the Goods and Special Services, and will issue clarifications, interpretations, and decisions regarding such issues.

B. Acting on behalf of Buyer under the provisions of Article 9, Engineer has the authority to disapprove or reject Goods and Special Services that Engineer believes to be non-conforming. Engineer also has the authority to require special inspection or testing of the Goods or Special Services as provided in Paragraph 9.02, whether or not the Goods are fabricated or installed, or the Special Services are completed.

C. Engineer may authorize minor deviations or variations in the Procurement Contract Documents by: 1) written approval of specific variations set forth in Shop Drawings when Seller has duly noted such variations as required in Paragraph 7.06.A.3, or 2) a Field Order.

D. As set forth in Article 12, Engineer will review Claims, and render decisions on Claims.

E. In rendering any interpretations, clarifications, reviews, decisions, disapprovals, acceptances, rejections, authorizations, and judgments, Engineer will not show partiality to Buyer or Seller. Engineer will not be liable to Buyer, Seller, or others in connection with any interpretations, clarifications, reviews, decisions, disapprovals, acceptances, rejections, authorizations, or judgments conducted or rendered by Engineer in good faith.

F. Engineer will not supervise, direct, control, or have authority over or be responsible for the means, methods, techniques, sequences, or procedures used by Seller to perform its obligations under this Procurement Contract, or the safety precautions and programs incident thereto, or for any failure of Seller to comply with Laws and Regulations applicable to the performance of its obligations. Engineer will not be responsible for Seller's failure to furnish the Goods and Special Services in accordance with the Procurement Contract Documents.

ARTICLE 11—CHANGES

11.01 *Amending and Supplementing the Procurement Contract*

A. The Procurement Contract may be amended or supplemented by a Change Order, a Change Directive, or a Field Order.

B. If an amendment or supplement to the Procurement Contract includes a change in the Procurement Contract Price or the Procurement Contract Times, such amendment or supplement must be set forth in a Change Order.

C. All changes to the Procurement Contract that involve (1) the conformance or acceptability of the Goods and Special Services, (2) the design (as set forth in the Procurement Drawings, Procurement Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Buyer and Seller may amend other terms and conditions of the Procurement Contract without the recommendation of the Engineer.

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11.02 *Change Orders*

A. Buyer and Seller shall execute appropriate Change Orders covering:

1. Changes in Procurement Contract Price or Procurement Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Goods and Special Services furnished in accordance with a Change Directive;

2. Changes in Procurement Contract Price resulting from a Buyer set-off, unless Seller has duly contested such set-off;

3. Changes in the Goods and Special Services which are: (a) ordered by Buyer pursuant to Paragraph 11.05, (b) required because of Buyer's acceptance of non-conforming Goods and Services under Paragraph 9.03 or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Goods and Special Services involves the design (as set forth in the Procurement Drawings, Procurement Specifications, or otherwise) or other engineering or technical matters; and

4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Change Directive; Article 12, Claims; and similar provisions.

B. If Buyer or Seller refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Change Directives*

A. A Change Directive will not change the Procurement Contract Price or the Procurement Contract Times but is evidence that the parties expect that the modification ordered or documented by a Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Change Directive's effect, if any, on the Procurement Contract Price and Procurement Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Procurement Contract Documents governing adjustments, expressly including Paragraph 11.08 regarding change of Procurement Contract Price.

B. If Buyer has issued a Change Directive and Buyer or Seller believes that an adjustment in Procurement Contract Times or Procurement Contract Price is necessary, then such party shall submit a Claim seeking such an adjustment no later than 30 days after the completion of the Goods and Services set out in the Change Directive.

11.04 *Field Orders*

A. Engineer may authorize minor changes in the Goods and Services if the changes do not involve an adjustment in the Procurement Contract Price or the Procurement Contract Times and are compatible with the design concept as indicated by the Procurement Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Buyer and also on Seller, which shall perform the Goods and Special Services involved promptly.

B. If Seller believes that a Field Order justifies an adjustment in the Procurement Contract Price or Procurement Contract Times, then before proceeding with the Goods and Special Services at issue, Seller shall submit a Claim as provided herein.

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11.05 *Buyer-Authorized Changes in the Goods and Special Services*

A. Without invalidating the Procurement Contract and without notice to any surety, Buyer may, at any time or from time to time, order additions, deletions, or revisions in the Goods and Special Services. Changes involving the design (as set forth in the Procurement Drawings, Procurement Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.

B. Such changes in the Goods and Special Services may be accomplished by a Change Order, if Buyer and Seller have agreed as to the effect, if any, of the changes on Procurement Contract Times or Procurement Contract Price; or by a Change Directive. Upon receipt of any such document, Seller shall promptly proceed with the Goods and Special Services involved; or, in the case of a deletion in the Goods and Special Services, promptly cease activities with respect to such deletion. Added or revised Goods and Special Services must be performed under the applicable conditions of the Procurement Contract Documents.

11.06 *Buyer's Contingency Allowance*

A. The Buyer's Contingency Allowance, if any such is set forth in the Procurement Agreement, is for the sole use of Buyer to cover unanticipated costs.

B. If Buyer exercises its unilateral right to use all or a portion of the Buyer's Contingency Allowance, Buyer will issue a written directive that documents the costs to which the allowance is applied, Seller's entitlement to compensation, and the consequent reduction in such allowance.

C. Prior to final payment, the Total Price, as set forth in the Procurement Agreement, will be duly adjusted to account for any unused portion of the Buyer's Contingency Allowance.

D. The Procurement Agreement, Article 5, addresses the impact on Buyer's Contingency Allowance of an assignment of the Procurement Contract.

11.07 *Unauthorized Changes in the Goods and Special Services*

A. Seller shall not be entitled to an increase in the Procurement Contract Price or an extension of the Procurement Contract Times with respect to any work performed that is not required by the Procurement Contract Documents, as amended, modified, or supplemented.

11.08 *Change of Procurement Contract Price*

A. The Procurement Contract Price may only be changed by a Change Order. Any Claim for an adjustment of Procurement Contract Price must comply with the provisions of Article 12.

B. An adjustment in the Procurement Contract Price will be determined as follows:

1. For changes in Unit Price Goods and Special Services, by application of the unit prices to the quantities of the items involved;

2. To the extent the cost of the change is not covered by unit prices, then by a mutually agreed lump sum; or

3. To the extent the cost of the change is not covered by unit prices and the parties do not reach mutual agreement to a lump sum, then on the basis of documented costs plus a Seller's fee for overhead and profit of 15%.

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11.09 *Change of Procurement Contract Times*

A. The Procurement Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Procurement Contract Times must comply with the provisions of Article 12.

11.10 *Notification to Surety*

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

ARTICLE 12—CLAIMS, DISPUTES, AND DISPUTE RESOLUTION

12.01 *Claims*

A. The parties agree to endeavor to avoid or resolve Claims through direct, good faith discussions and negotiations whenever practicable. Such discussions and negotiations should at the outset address whether the parties mutually agree to suspend the Claims process, including the time periods established in this Paragraph 12.01; if so, a written record of such mutual agreement should be made and jointly executed.

B. Claimant shall deliver to Engineer and the other party to the Procurement Contract written notice of each Claim within 15 days after the occurrence of the event giving rise to the Claim.

C. Claimant shall deliver written supporting data to Engineer and the other party within 45 days after such occurrence unless Engineer allows an additional period of time.

D. Engineer will review each such Claim and render a decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

E. If Engineer does not render a formal written decision on a Claim within the time stated in Paragraph 12.01.D., Engineer shall be deemed to have issued a decision denying the Claim in its entirety 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

F. The rendering of a decision by Engineer pursuant to this Paragraph 12.01 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment) will be a condition precedent to any exercise by Buyer or Seller of such rights or remedies as either may otherwise have under the Procurement Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter. If the exercise of such rights or remedies will imminently be time-barred, a party may take actions necessary to preserve such rights and remedies notwithstanding the lack of the condition precedent referred to in this paragraph.

G. If a submitted matter in question concerns terms and conditions of the Procurement Contract Documents that do not involve (1) the performance or acceptability of Goods and Special Services under the Procurement Contract Documents, (2) the design (as set forth in the Procurement Drawings, Procurement Specifications, Addenda, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Buyer and Seller that Engineer is unable to provide a decision or interpretation. If Buyer and Seller

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are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Paragraph 12.02.

H. Engineer's written decision on such Claim or a decision denying the Claim in its entirety that is deemed to have been issued pursuant to Paragraph 12.01, will be final and binding upon Buyer and Seller 30 days after it is issued unless within 30 days of issuance Buyer or Seller appeals Engineer's decision by initiating the mediation of such Claim in accordance with the dispute resolution procedures set forth in Paragraph 12.02.

I. If Article 12 has been amended to delete the mediation requirement, then Buyer or Seller may appeal Engineer's decision within 30 days of issuance by following the alternative dispute resolution process set forth in Article 12, as amended; or if no such alternative dispute resolution process has been set forth, Buyer or Seller may appeal Engineer's decision by 1) delivering to the other party within 30 days of the date of such decision a written notice of intent to submit the Claim to a court of competent jurisdiction, and 2) within 60 days after the date of such decision instituting a formal proceeding in a court of competent jurisdiction.

J. No Claim for an adjustment in Procurement Contract Price or Procurement Contract Times will be valid if not submitted in accordance with Article 12.

K. The effect on Claims of an assignment of the Procurement Contract by Buyer to a Contractor/Assignee is addressed in the Procurement Agreement, Article 5.

12.02 *Dispute Resolution Method*

A. Either Buyer or Seller may initiate the mediation of (1) any Claim decided in writing by Engineer under Paragraph 12.01 before such decision becomes final and binding, or (2) any other dispute between the parties, including but not limited to any dispute arising after final inspection of the Goods and Services. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Procurement Contract. The request for mediation must be submitted in writing to the American Arbitration Association and the other party to the Procurement Contract. Timely submission of the request will stay Engineer's decision from becoming final and binding.

B. Mediation is a condition precedent to seeking final dispute resolution under Paragraph 12.01.C. Buyer and Seller shall participate in the mediation process in good faith. The process must be concluded within 60 days of filing of the request. The date of termination of the mediation will be determined by application of the mediation rules referenced above.

C. If the mediation process does not result in resolution of the dispute, then Engineer's written Claim decision under Paragraph 12.01.D or a Claim denial pursuant to Paragraph 12.01.E becomes final and binding, or if applicable such other dispute is deemed resolved in favor of respondent, unless, within 30 days after termination of the mediation, Buyer or Seller:

1. elects in writing to invoke any final dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim or dispute to another final dispute resolution process, or

3. if no final dispute resolution process has been provided for in the Supplementary Conditions, delivers to the other party written notice of the intent to submit the Claim

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or dispute to a court of competent jurisdiction, and within 60 days of the termination of the mediation institutes such formal proceeding.

ARTICLE 13—PAYMENT

13.01 *Applications for Progress Payments*

A. Seller shall submit to Buyer for Engineer's review Applications for Payment filled out and signed by Seller and accompanied by such supporting documentation as is required by the Procurement Contract Documents and also as Buyer or Engineer may reasonably require.

B. The timing and amounts of progress payments will be as stipulated in the Procurement Agreement.

C. Any Application for Payment that is based in whole or in part on the delivery of Goods must be accompanied by a bill of sale, invoice, or other documentation reasonably satisfactory to Buyer warranting that Buyer has rightfully received good title to the Goods from Seller and that, upon payment, the Goods will be free and clear of all liens. Such documentation will include releases and waivers from all parties with viable lien rights.

D. Buyer shall notify Seller promptly of any deficiency in the required documentation.

13.02 *Review of Applications for Progress Payments*

A. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Buyer, or return the Application to Seller indicating in writing Engineer's reasons for refusing to recommend payment.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Buyer, based on Engineer's observations of Seller's progress, as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Goods and Special Services or other obligations of Seller have progressed to the point indicated;

b. the quality of the Goods and Special Services or other obligations of Seller are generally in accordance with the Procurement Contract Documents; and

c. the conditions precedent to Seller being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Seller's progress.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Goods and Special Services or other obligations of Seller have been exhaustive, extended to every aspect of the Goods and Special Services or other obligations of Seller in progress, or involved detailed inspections of the Goods and Special Services or other

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obligations of Seller beyond the responsibilities specifically assigned to Engineer in the Procurement Contract; or

b. there may not be other matters or issues between the parties that might entitle Seller to be paid additionally by Buyer, or entitle Buyer to withhold payment to Seller.

4. Neither Engineer's review of Seller's progress for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Seller's performance or furnishing of Goods and Special Services or other obligations of Seller; or

b. for the means, methods, techniques, sequences, or procedures of construction, manufacturing, fabrication, installation, or shipping, or the safety precautions and programs incident thereto; or

c. for Seller's failure to comply with Laws and Regulations applicable to Seller's performance under the Procurement Contract; or

d. to make any examination to ascertain how or for what purposes Seller has used the money paid for the Procurement Contract Price; or

e. to determine that title to any of the Goods or component parts have passed to Buyer free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Buyer stated in Paragraph 13.02.A.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Buyer from loss because:

a. the Goods and Services are non-conforming, requiring correction or replacement;

b. the Procurement Contract Price has been reduced by Change Orders;

c. Buyer has been required to correct non-conforming Goods and Special Services in accordance with Paragraph 9.03.C, or has accepted non-conforming Goods and Special Services pursuant to Paragraph 9.03.E; or

d. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Seller and therefore justify termination for cause under the Procurement Contract Documents.

13.03 *Basis and Amount of Progress Payments*

A. The basis and amounts of the progress payments will be as provided in the Procurement Agreement, subject to the provisions of this Article 13 regarding reductions in payment.

13.04 *Suspension of or Reduction in Payment*

A. Buyer may temporarily cease making progress payments, or reduce the amount of a progress payment, even though recommended for payment by Engineer, under the following circumstances:

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1. Buyer has reasonable grounds to conclude that Seller will not furnish the Goods or the Special Services in accordance with the Procurement Contract Documents, and

2. Buyer has requested in writing assurances from Seller that the Goods and Special Services will be delivered or furnished in accordance with the Procurement Contract Documents, and Seller has failed to provide adequate assurances within ten days of Buyer's written request.

3. In addition to any reductions in payment (set-offs) recommended by Engineer, Buyer is entitled to impose a set-off against payment based on any of the following:

    a. claims have been made against Buyer based on Seller's conduct in the performance or furnishing of the Goods and Special Services, or has incurred costs, losses, or damages resulting from Seller's conduct in the performance or furnishing of the Goods and Special Services, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

    b. Seller has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Point of Destination or the worksite;

    c. Seller has failed to provide and maintain required bonds or insurance;

    d. Buyer has incurred extra charges or engineering costs related to Submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

    e. the Goods and Special Services are non-conforming, requiring correction or replacement;

    f. Buyer has been required to correct non-conforming Goods and Special Services, in accordance with Paragraph 9.03.C, or has accepted non-conforming Goods and Special Services pursuant to Paragraph 9.03.E;

    g. the Procurement Contract Price has been reduced by Change Orders;

    h. an event that would constitute a default by Seller and therefore justify a termination for cause has occurred;

    i. liquidated or other damages have accrued as a result of Seller's failure to achieve Milestones, Substantial Completion, or final completion of the Goods and Special Services; or

    j. liens have been filed in connection with the Procurement Contract, except where Seller has delivered a specific bond satisfactory to Buyer to secure the satisfaction and discharge of such liens.

B. If Buyer refuses to make payment of the full amount recommended by Engineer, Buyer will provide Seller and Engineer immediate written notice stating the reason for such action and promptly pay Seller any amount remaining after deduction of the amount withheld. Buyer shall promptly pay Seller the amount withheld when Seller corrects the reason for such action to Buyer's satisfaction.

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13.05 *Final Payment*

A. After Seller has corrected all non-conformities to the reasonable satisfaction of Buyer and Engineer and furnished all Special Services, Seller may submit its final Application for Payment following the procedures for progress payments.

B. The final Application for Payment will be accompanied by all documentation called for in the Procurement Contract Documents (including but not limited to all final operations and maintenance manuals, and any special warranties), a list of all unsettled Claims, and the written consent of surety to the making of final payment.

C. If, on the basis of final inspection and the review of the final Application for Payment and accompanying documentation, Engineer is reasonably satisfied that Seller has furnished the Goods and Special Services in accordance with the Procurement Contract Documents, and that Seller has fulfilled all other obligations under the Procurement Contract Documents, then Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment subject to the provisions of Paragraph 13.02, and present the final Application for Payment to Buyer. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Buyer from loss for the reasons stated in Paragraph 13.02.

D. If Engineer does not recommend final payment, Engineer will return the final Application for Payment to Seller, indicating the reasons for refusing to recommend final payment, in which case Seller shall make the necessary corrections and resubmit the final Application for Payment.

E. In support of its recommendation of final payment Engineer will also give written notice to Buyer and Seller that the Goods and Special Services are acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 13.06.

F. If the final Application for Payment and accompanying documentation are appropriate as to form and substance, Buyer shall, within 30 days after receipt thereof, pay Seller the amount recommended by Engineer, less any sum Buyer is entitled to set off against Engineer's recommendation, pursuant to the provisions of Paragraph 13.04.

G. Buyer will not make final payment, or return or release included retainage (if any) at any time, unless Seller submits written consent of the surety to such payment, return, or release.

13.06 *Waiver of Claims*

A. By making final payment, Buyer waives its claim or right to liquidated damages or other damages for late completion by Seller, except as set forth in an outstanding Claim, appeal, set-off, or express reservation of rights by Buyer. Buyer reserves all other claims or rights after final payment.

B. The acceptance of final payment by Seller will constitute a waiver by Seller of all claims and rights against Buyer other than those pending matters that have been duly submitted or appealed under the provisions of Article 12.

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ARTICLE 14—CANCELLATION, SUSPENSION, AND TERMINATION

14.01 *Cancellation*

A. Buyer has the right to cancel the Procurement Contract, without cause, at any time prior to delivery of the Goods by written notice. Cancellation pursuant to the terms of this paragraph will not constitute a breach of contract by Buyer. Upon cancellation:

1. Buyer shall pay Seller for the direct costs incurred in producing any Goods that Seller has specially manufactured for the Project, plus a fair and reasonable amount for overhead and profit.

2. For Goods that are not specially manufactured for the Project, Seller shall be entitled to a restocking charge of 10 percent of the unpaid Procurement Contract Price of such Goods.

14.02 *Suspension of Performance by Buyer*

A. Buyer has the right to suspend performance of the Procurement Contract for up to 90 days, without cause, by written notice. Upon suspension under this paragraph, Seller shall be entitled to an increase in the Procurement Contract Times and Procurement Contract Price caused by the suspension, provided that performance would not have been suspended or delayed for causes attributable to Seller.

14.03 *Suspension of Performance by Seller*

A. Seller may suspend the furnishing of the Goods and Special Services only under the following circumstance:

1. Seller has reasonable grounds to conclude that Buyer will not perform its future payment obligations under the Procurement Contract; and

2. Seller has requested in writing assurances from Buyer that future payments will be made in accordance with the Procurement Contract, and Buyer has failed to provide such assurances within ten days of Seller's written request.

14.04 *Breach and Termination*

A. *Buyer's Breach*

1. Seller shall have the right to terminate the Procurement Contract for cause by declaring a breach if Buyer fails to comply with any material provision of the Procurement Contract. Upon termination, Seller shall be entitled to all remedies provided by Laws and Regulations.

2. If Seller believes Buyer is in breach of its obligations under the Procurement Contract, Seller shall provide Buyer with reasonably prompt written notice setting forth in sufficient detail the reasons for declaring that it believes a breach has occurred. Buyer shall have 7 days from receipt of the written notice declaring the breach (or such longer period of time as Seller may grant in writing) within which to cure or to proceed diligently to cure such alleged breach.

B. *Seller's Breach*

1. Buyer may terminate Seller's right to perform the Procurement Contract for cause by declaring a breach should Seller fail to comply with any material provision of the

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Procurement Contract Documents. Upon termination, Buyer shall be entitled to all remedies provided by Laws and Regulations.

2. In the event Buyer believes Seller is in breach of its obligations under the Procurement Contract, Buyer shall provide Seller with reasonably prompt written notice setting forth in sufficient detail the reasons for declaring that it believes a breach has occurred. Seller shall have 7 days from receipt of the written notice declaring the breach (or such longer period of time as Buyer may grant in writing) within which to cure or to proceed diligently to cure such alleged breach.

3. If and to the extent that Seller has provided a performance bond under the provisions of Paragraph 5.01, the notice and cure procedures of that bond, if any, will supersede the notice and cure procedures of Paragraph 14.04.B.2.

ARTICLE 15—MISCELLANEOUS

15.01 *Giving Notice*

A. Whenever any provision of the Procurement Contract requires the giving of written notice to Buyer, Seller, or Engineer, it will be deemed to have been validly given if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient's place of business;

2. by registered or certified mail, postage prepaid, to the recipient's place of business; or

3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

15.02 *Controlling Law*

A. This Procurement Contract is to be governed by the law of the state in which the Goods are to be installed.

B. In the case of any conflict between the express terms of this Procurement Contract and the Uniform Commercial Code, as adopted in the state whose law governs, it is the intent of the parties that the express terms of this Procurement Contract will apply.

15.03 *Computation of Time*

A. When any period of time is referred to in the Procurement Contract by number of days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

15.04 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Procurement Contract, and the provisions of this paragraph will be as effective as if repeated specifically in the Procurement Contract in connection with each particular duty, obligation, right, and remedy to which they apply.

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15.05 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Procurement Contract, as well as all continuing obligations indicated in the Procurement Contract, will survive final payment, completion, and acceptance of the Goods and Special Services or termination or completion of the Procurement Contract or of the services of Seller.

15.06 *Entire Agreement*

A. Buyer and Seller agree that this Procurement Contract is the complete and final agreement between them, and supersedes all prior negotiations, representations, or agreements, either written or oral. This Procurement Contract may not be altered, modified, or amended except in writing signed by an authorized representative of both parties.

15.07 *No Waiver*

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

15.08 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

15.09 *Successors and Assigns*

A. Buyer and Seller each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Procurement Contract.

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

SUPPLEMENTARY CONDITIONS OF THE PROCUREMENT CONTRACT

Prepared By

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

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SUPPLEMENTARY CONDITIONS OF THE PROCUREMENT CONTRACT

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SUPPLEMENTARY CONDITIONS OF THE PROCUREMENT CONTRACT

These Supplementary Conditions amend or supplement EJCDC® P-700, Standard General Conditions of the Procurement Contract (2019). The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added—for example, “Paragraph SC-4.05.”

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms - NA*

1.02 *Terminology - NA*

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance - NA*

2.02 *Copies of Documents -*

SC-2.02 Amend the first sentence of Paragraph 2.02.A. to read as follows:

Buyer shall furnish to Seller three printed copies of the Procurement Contract Documents (including one fully signed counterpart of the Procurement Agreement), and one copy in electronic portable document format (PDF).

2.03 *Electronic Transmittals - NA*

2.04 *Preliminary Schedules - NA*

ARTICLE 3—PROCUREMENT CONTRACT DOCUMENTS

3.01 *Intent - NA*

3.02 *Reference Standards - NA*

ARTICLE 4—COMMENCEMENT AND PROGRESS OF WORK

No suggested Supplementary Conditions in this Article.

ARTICLE 5—BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

SC-5.01 Add the following paragraphs immediately after Paragraph 5.01.A:

1. *Required Performance Bond Form*: The performance bond that Seller furnishes will be in the form of EJCDC® P-610, Performance Bond (2010 or 2019 edition).

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2. *Required Payment Bond Form*: The payment bond that Contractor furnishes will be in the form of EJCDC® P-615, Payment Bond (2010 or 2019 edition).

5.02 *Insurance*

SC-5.02 Add the following new paragraphs immediately after Paragraph 5.02.E:

F. Seller shall purchase and maintain such liability and other insurance as is appropriate for the furnishing of Goods and Special Services and as will provide protection from claims set forth below which may arise out of or result from Seller's furnishing of the Goods or Special Services and Seller's other obligations under the Procurement Contract Documents, whether the furnishing of Goods and Special Services or other obligations are to be performed by Seller, any subcontractor or supplier, or by anyone directly or indirectly employed by any of them to furnish the Goods and Special Services, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Seller's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Seller's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained: (a) by any person as a result of an offense directly or indirectly related to the employment of such person by Seller, or (b) by any other person for any other reason;

5. claims for damages, other than to the Goods, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

G. The policies of insurance so required by this Paragraph 5.02 to be purchased and maintained must:

with respect to insurance required by Paragraphs SC-5.02.F.3 through SC-5.02.F.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) The State of North Dakota and its agencies, offices, and employees (State), North Dakota State Water Commission, Advanced Engineering and Environmental Services, Inc., and Cass Rural Water District its agents, officers, employees and subconsultants shall be endorsed on the commercial general liability policy, including any excess policies (to the extent applicable), as additional insured. The State, Advanced Engineering and Environmental Services, LLC., and Cass Rural Water District, its agents, officers, employees, and subconsultants shall have all the benefits, rights and coverages of an additional insured under these policies.

1. and the insurance afforded to these additional insureds must provide primary coverage for all claims covered thereby;

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2. include at least the specific coverages and be written for not less than the limits of liability provided below or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering Seller's indemnity obligations under Paragraph 7.07;

5. contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder will provide a copy of the notice to the other party, each other insured, and Engineer;

6. remain in effect at least until final payment and at all times thereafter when Seller may be correcting, removing, or replacing non-conforming Goods in accordance with Paragraph 9.03 and 9.04; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and Seller shall furnish Buyer and each other additional insured identified in these Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Buyer and any such additional insured of continuation of such insurance at final payment and one year thereafter).

8.

H. The limits of liability for the insurance required by Paragraph SC-5.02.F must provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverage under Paragraphs 6.03.A.1 and A.3 of the General Conditions:

    a. State: Statutory

    b. Applicable Federal
    (e.g., Longshoreman's): Statutory

    c. Employer's Liability: $500,000

2. Contractor's General Liability under Paragraphs 6.03.B.3 through B.5 and 6.03.d of the General Conditions which shall include completed operations and product liability coverage and eliminate the exclusion with respect to property under the care, custody and control of Contractor.

    a. General Aggregate $2,000,000

    b. Products – Completed
    Operations Aggregated $1,000,000

    c. Personal and Advertising
    Injury $1,000,000

    d. Each Occurrence
    (Bodily Injury and Property Damage) $1,000,000

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e. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.

3. Automobile Liability under Paragraph 6.03.D of the General Conditions:

   a. Bodily Injury:
   Each person $500,000
   Each Accident $1,000,000

   b. Property Damage:
   Each Accident $1,000,000

   c. Combined Single
   Limit of $2,000,000

4. The Contractual Liability coverage required by Paragraph 6.03.C.2 of the General Conditions shall provide coverage for not less than the following amounts:

   a. Bodily Injury:
   Each Accident $1,000,000
   Annual Aggregate $1,000,000

   b. Property Damage:

   Each Accident $1,000,000
   Annual Aggregate 1,000,000

I. Seller shall deliver to Buyer, with copies to each additional insured identified in these Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Buyer or any other additional insured) which Seller is required to purchase and maintain.

ARTICLE 6—LICENSES AND FEES

No suggested Supplementary Conditions in this Article.

ARTICLE 7—SELLER'S RESPONSIBILITIES

7.03 *Laws and Regulations - NA*

7.04 *"Or Equals" –*

SC-7.04 Add the following new subparagraph immediately after Paragraph 7.04.B:

1. "Or Equals" items of materials or equipment will be considered only during the bidding period as outlined in the Instructions to Bidders.

7.05 *Taxes*

SC-7.05 Add a new paragraph immediately after Paragraph 7.05.A:

B. Buyer is exempt from payment of sales and compensating use taxes of the State of **North Dakota** and of cities and counties thereof on all materials and equipment to be incorporated into the Project facilities.

1. Buyer will furnish the required certificates of tax exemption to Seller with respect to materials and equipment to be incorporated into the Project facilities.

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2. Buyer's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Seller, or to supplies or materials not incorporated into the Project facilities.

3. The Procurement Contract Price does not include the cost of sales or compensating use taxes to the extent such are exempted by this paragraph.

7.06 *Submittals- NA*

7.07 *Indemnification- NA*

ARTICLE 8—SHIPPING AND DELIVERY

8.02 *Delivery - NA*

8.03 *Risk of Loss - NA*

ARTICLE 9—BUYER'S RIGHTS

9.04 *Correction Period - NA*

9.05 *Limitation of Seller's Liability*

SC-9.05 Add the following new paragraph after Paragraph 9.04:

9.05 *Limitation of Seller's Liability*

A. Buyer and Seller agree that the total liability of Seller to Buyer for claims, costs, losses, and damages arising from this Procurement Contract will be limited to the amount established in the Procurement Agreement as the Procurement Contract Price.

B. Upon assignment the terms of this Paragraph 9.05 will be binding upon both the assignor and assignee with respect to Seller's liability, The terms of this limitation do not apply to or limit any claim by Buyer against Seller based on any of the following: (a) contribution or indemnification with respect to third-party claims, losses, and damages; (b) costs, losses, or damages attributable to personal or bodily injury, sickness, disease, or death, or to injury to or destruction of the tangible property of others, (c) intentional or reckless wrongful conduct, or (d) rights conferred by any bond provided by Seller under this Contract.

ARTICLE 10—ENGINEER'S STATUS

ARTICLE 11—CHANGES

No suggested Supplementary Conditions in this Article.

ARTICLE 12—CLAIMS, DISPUTES, AND DISPUTE RESOLUTION

12.03 *Arbitration*

SC-12.03 Add the following new paragraph immediately after Paragraph 12.02:

12.03 *Arbitration*

A. All matters subject to final resolution under this Article will be settled by arbitration administered by the American Arbitration Association in accordance with its Construction

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Industry Arbitration Rules (subject to the conditions and limitations of this Paragraph SC-12.03). This agreement to arbitrate will be specifically enforceable under the prevailing law of any court having jurisdiction.

B. The demand for arbitration will be filed in writing with the other party to the Procurement Contract and with the selected arbitration administrator, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the specific time required in Article 12, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event will 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.

C. The arbitrator(s) must be licensed engineers, contractors, attorneys, or construction managers. Hearings will take place pursuant to the standard procedures of the Construction Arbitration Rules that contemplate in-person hearings. The arbitrators will have no authority to award punitive or other damages not measured by the prevailing party's actual damages, except as may be required by statute or the Procurement Contract. Any award in an arbitration initiated under this clause will be limited to monetary damages and include no injunction or direction to any party other than the direction to pay a monetary amount.

D. The arbitrators will have the authority to allocate the costs of the arbitration process among the parties, but will only have the authority to allocate attorneys' fees if a specific Law or Regulation or this Procurement Contract permits them to do so.

E. The award of the arbitrators must be accompanied by a reasoned written opinion and a concise breakdown of the award. The written opinion will cite the Procurement Contract provisions deemed applicable and relied on in making the award.

F. The parties agree that failure or refusal of a party to pay its required share of the deposits for arbitrator compensation or administrative charges will constitute a waiver by that party of the right to present evidence or cross-examine witness. In such event, the other party shall be required to present evidence and legal argument as the arbitrator(s) may require for the making of an award. Such waiver will not allow for a default judgment against the non-paying party in the absence of evidence presented as provided for above.

G. No arbitration arising out of or relating to the Procurement Contract will 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 Procurement Contract unless:

1. the inclusion of such other individual or entity will allow complete relief to be afforded among those who are already parties to the arbitration;

2. 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;

3. such other individual or entity is subject to arbitration under a contract with either Buyer or Seller, or consents to being joined in the arbitration; and

4. the consolidation or joinder is in compliance with the arbitration administrator's procedural rules.

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H. 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.

I. Except as may be required by Laws or Regulations, neither party nor an arbitrator may disclose the existence, content, or results of any arbitration hereunder without the prior written consent of both parties, with the exception of any disclosure required by Laws and Regulations or the Procurement Contract. To the extent any disclosure is allowed pursuant to the exception, the disclosure must be strictly and narrowly limited to maintain confidentiality to the extent possible.

ARTICLE 13—PAYMENT

13.01 *Applications for Progress Payments - NA*

13.02 *Review of Applications for Progress Payments - NA*

ARTICLE 14—CANCELLATION, SUSPENSION, AND TERMINATION

No suggested Supplementary Conditions in this Article. - NA

ARTICLE 15—MISCELLANEOUS

No suggested Supplementary Conditions in this Article. - NA

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DIVISION 01
GENERAL REQUIREMENTS

DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01011 – SUMMARY OF PROJECT

PART 1 GENERAL

1.01 SCOPE OF WORK UNDER THIS CONTRACT

A. The project work consists generally of the construction of the following:
1. Williston WRRF Reuse Pump Station

Contract No. 1 – Procurement Bid Only: Manufacture and Supply of Prefabricated Pump Station. The prefabricated pump station includes: the steel pump station structure including walls, floor, and ceiling, for a buried installation; foundation and roof support systems for the buried installation; stairway access to the buried pump station vault; access hatches; two (2) 500 gpm and one (1) 50 gpm multistage vertical centrifugal pumps, motors, and variable frequency drives; a magnetic flow meter; process piping and valves; sump pump; unit heater; dehumidifier; lighting, electrical, and control systems; and related appurtenances. This contract includes the furnishing and delivery of the prefabricated pump station to the Owner's delivery location by the date specified. Installation of the pump station will be completed under a separate contract.

1.02 WORK BY OWNER.

A. Work by Owner.
1. Not applicable.

1.03 WORK SEQUENCE

A. Contractor shall complete the project according to the following Project Schedule:

1. Contract No. 1:

a. Final Completion as set forth in the Agreement.

1.04 STARTUP

A. Startup service will include supplying four (4) bound O&M manuals and two (2) USB Flash Drives.

END OF SECTION

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DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01019 – CONTRACT CONSIDERATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Schedule of Values.

B. Related Sections:
   1. Section 01025 – Measurement and Payment.
   2. Section 01027 – Application for Payment.
   3. Section 01028 – Modifications Requirements.
   4. Section 01300 – Submittals.
   5. Section 01600 – Materials and Equipment.

1.02 SCHEDULE OF VALUES

A. Typed schedule of values in format similar to Engineers Joint Contract Documents Committee (EJCDC) Application for Payment.

B. Format:
   1. Identify site mobilization and bonds and insurance.
   2. Include within each line item, a direct proportional amount of Contractor's overhead and profit.
   3. For Unit Bid Price Contracts utilize the items listed on the bid form.

C. Revise schedule to list approved Change Orders, with each Application for Payment.

1.03 ALTERNATES

A. Owner has complete authority to accept or reject any and/or all alternate bids. Alternates quoted on the Bid Form will be reviewed and accepted or rejected at the Owner's option. Bidders shall allocate all costs for construction of each Alternate in the appropriate bid form line item.

B. Accepted Alternates will be identified in the Owner-Contractor Agreement.

C. Coordinate related Work and modify surrounding Work as required to accommodate Alternate(s) selected.

D. Alternate Bid items shall include all Work and materials necessary for proper installation of the Alternate items.

E. Refer to the applicable Specifications and Drawings for the respective Alternates as identified in Section 01011.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used

END OF SECTION

DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01025 – MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Measurement and payment criteria applicable to the Work.
2. Defect assessment and non-payment for rejected Work.

B. Related Sections:
1. Document P400 – Bid Form Procurement
2. Document P520 – Agreement Form.
3. Document P700 – General Conditions.
4. Document P800 – Supplementary Conditions.
5. Section 01011 – Summary of Project.
6. Section 01019 – Contract Considerations.
7. Section 01027 – Applications for Payment.

1.01 AUTHORITY

A. Engineer and Owner will make final determinations regarding the completeness of Work, and subsequent payment of such Work.

B. Engineer and Owner will take all measurements and compute quantities accordingly.

C. Assist by providing necessary measurements, supporting data, and field data as required.

1.02 BID ITEMS

A. Quantities indicated in the Bid Form are for Bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Engineer shall determine payment.

B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit prices contracted. No other items of Work required by the Drawings or Specifications shall be measured or paid for separately, but shall be included as part of the listed items to which the Work pertains. Failure to list all such related Work in the following descriptions of items shall not invalidate this stipulation nor relieve the Contractor from his obligation for such Work.

1.03 PAYMENT

A. Payment Includes: Full compensation for all required mobilization, bonding, insurance, labor, skill, products, tools, equipment, transportation, services, incidentals, erection, application and installation of the Work; submittal of shop

drawings, product data and operation and maintenance data or manuals, record data, start-up and system demonstration, where required; warranties, overhead and profit.

B. Final payment for Work will be made on the basis of the Work accepted by the Engineer and Owner.

1.04 DEFECT ASSESSMENT

A. Replace the Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of the Engineer, it is not practical to remove and replace the Work, the Engineer will direct one of the following remedies:
   1. The defective Work may remain, but the price will be adjusted to a new price at the discretion of the Engineer and Owner.
   2. The defective Work will be partially repaired to the satisfaction of the Engineer and Owner, and the price will be adjusted at the discretion of the Engineer and Owner.

C. The authority of the Engineer and Owner to assess the defect and determine payment adjustment is final.

1.05 NON-PAYMENT FOR REJECTED PRODUCTS

A. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

1.06 DESCRIPTION OF LUMP SUM PRICES FOR CONTRACT NO. 1 – BASE BID, GENERAL CONSTRUCTION

A. Base Bid – Procurement Bid Only (Lump Sum): Mobilization, bonding, and insurance for all Project work shown on the Drawings; factory testing; fabrication and delivery of a prefabricated pump station. Project includes furnishing and installing all related water process piping, pumps, fittings, and valves; vault penetrations; furnish and install of complete cathodic protection equipment; finishes (painting, coatings); Electrical work; Instrumentation and Controls.

1.07 CHANGES IN PLAN QUANTITY

A. Plan quantities are based on assumed existing conditions and/or as stated in payment sections or notes. An increase or decrease from the number of units shown in the Bid Form shall not cause a change in the unit price except as allowed by the General Conditions or modified by the Supplementary Conditions.

1.08 INCIDENTAL ITEMS

A. Work required by the Contract Documents but not listed as a bid item shall be considered incidental to the Contract.

B. Performance Testing including, but not limited to, cleaning and flushing of pipelines, compaction testing, leakage and hydrostatic pressure testing, including corporation stops and service saddles, sterilization, compaction testing, concrete testing and performance testing required in individual Specification Sections shall be considered incidental to items of Work for which direct payment is made.

C. Pipe restraints and associated fittings; retainer glands, thrust blocking or reaction backing; resting blocks, pipe bedding materials; polyethylene encasement; special linings; insulation; concrete encasement; transition couplings shall be considered incidental to items of Work for which direct payment is made.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used.

END OF SECTION

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DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01027 – APPLICATIONS FOR PAYMENT

1.01 SUMMARY

A. Section includes:
1. Format and Preparation of Applications.
2. Submittal Procedures.
3. Substantiating Data.

B. Related Sections include:
1. Document P520 – Agreement Form.
2. Document P700 – General Conditions.
3. Document P800 – Supplementary Conditions.
4. Section 01019 – Contract Considerations.
5. Section 01025 - Measurement and Payment
6. Section 01028 – Modification Requirements.
7. Section 01300 – Submittals.
8. Section 01700 - Contract Closeout.

1.02 FORMAT AND PREPARATION OF APPLICATIONS

A. Utilize: EJCDC Application for Payment Form (Form C-620, 2018 Edition) with Engineers standard cover sheet.

B. Preparation
1. Present required information in typewritten form.
2. Execute certification by signature of authorized officer.
3. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.
4. List each authorized Change Order as an extension on Continuation Sheet, listing Change Order number and dollar amount as for an original item of Work.

C. Prepare Application for Final Payment as specified in Section 01700.

1.03 SUBMITTAL PROCEDURES

A. Submittals
1. One electronic copy or two original copies of each Application for Payment, as directed by the Engineer.
2. Provide an updated construction schedule with each Application for Payment to the Engineer. The lack of an updated construction schedule may cause undue delays in reviewing the Application for Payment.
3. Provide Record Drawings and bore logs pertaining to work completed along with each application for payment. Failure to submit Drawings and logs may result in the pay application being denied.
4. Payment Periods: As stipulated in the Agreement.
5. Submit with transmittal letter as specified for Submittals in Section 01300.

6. Submit lien waivers with final application for payment.

1.04 SUBSTANTIATING DATA

A. When Engineer requires substantiating information, submit data justifying dollar amounts in question.

B. Provide one (1) copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

C. Provide copies of invoice(s) for payment of materials stored on-site. Payment will not be made for materials which are not stored on-site or within a bonded warehouse which has been approved by Engineer and Owner.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used.

END OF SECTION

Contractor's Application for Payment

Owner:		**Owner's Project No.:**	
Engineer:		**Engineer's Project No.:**	
Contractor:		**Contractor's Project No.:**	
Project:			
Contract:			
Application No.:		**Application Date:**	
Application Period:	**From**	**to**	

1. Original Contract Price				$ -
2. Net change by Change Orders				$ -
3. Current Contract Price (Line 1 + Line 2)				$ -
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)				$ -
5. Retainage				
a.	X	$ -	Work Completed	$ -
b.	X	$ -	Stored Materials	$ -
c. Total Retainage (Line 5.a + Line 5.b)				$ -
6. Amount eligible to date (Line 4 - Line 5.c)				$ -
7. Less previous payments (Line 6 from prior application)				
8. Amount due this application				$ -
9. Balance to finish, including retainage (Line 3 - Line 4)				$ -

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and

(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor:

Signature: **Date:**

Recommended by Engineer		**Approved by Owner**	
By:		**By:**	
Title:		**Title:**	
Date:		**Date:**	
Approved by Funding Agency			
By:		**By:**	
Title:		**Title:**	
Date:		**Date:**	

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Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner:		**Owner's Project No.:**	
Engineer:		**Engineer's Project No.:**	
Contractor:		**Contractor's Project No.:**	
Project:			
Contract:			

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
Original Contract								
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
	Original Contract Totals	$ -	$ -	$ -	$ -	$ -		$ -

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Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner:		**Owner's Project No.:**	
Engineer:		**Engineer's Project No.:**	
Contractor:		**Contractor's Project No.:**	
Project:			
Contract:			

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
Change Orders								
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
	Change Order Totals	$ -	$ -	$ -	$ -	$ -		$ -
Original Contract and Change Orders								
	Project Totals	$ -	$ -	$ -	$ -	$ -		$ -

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Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: _____ **Owner's Project No.:** _____
Engineer: _____ **Engineer's Project No.:** _____
Contractor: _____ **Contractor's Project No.:** _____
Project: _____
Contract: _____

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I	J	K	L
		Contract Information				Work Completed					
Bid Item No.	Description	Item Quantity	Units	Unit Price ($)	Value of Bid Item (C X E) ($)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) ($)	Materials Currently Stored (not in G) ($)	Work Completed and Materials Stored to Date (H + I) ($)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) ($)
Original Contract											
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
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					-		-		-		-
					-		-		-		-
				Original Contract Totals	$ -		$ -	$ -	$ -		$ -

EJCDC C-620 Contractor's Application for Payment
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Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: _____ **Owner's Project No.:** _____
Engineer: _____ **Engineer's Project No.:** _____
Contractor: _____ **Contractor's Project No.:** _____
Project: _____
Contract: _____

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I	J	K	L
		Contract Information				Work Completed					
Bid Item No.	Description	Item Quantity	Units	Unit Price ($)	Value of Bid Item (C X E) ($)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) ($)	Materials Currently Stored (not in G) ($)	Work Completed and Materials Stored to Date (H + I) ($)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) ($)
Change Orders											
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
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					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
				Change Order Totals	$ -		$ -	$ -	$ -		$ -
Original Contract and Change Orders											
				Project Totals	$ -		$ -	$ -	$ -		$ -

EJCDC C-620 Contractor's Application for Payment
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Stored Materials Summary

Contractor's Application for Payment

Owner:		**Owner's Project No.:**	
Engineer:		**Engineer's Project No.:**	
Contractor:		**Contractor's Project No.:**	
Project:			
Contract:			

Application No.: _____ **Application Period:** **From** _____ **to** _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I	J	K	L	M
						Materials Stored			Incorporated in Work			
Item No. (Lump Sum Tab) or Bid Item No. (Unit Price Tab)	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Description of Materials or Equipment Stored	Storage Location	Application No. When Materials Placed in Storage	Previous Amount Stored ($)	Amount Stored this Period ($)	Amount Stored to Date (G+H) ($)	Amount Previously Incorporated in the Work ($)	Amount Incorporated in the Work this Period ($)	Total Amount Incorporated in the Work (J+K) ($)	Materials Remaining in Storage (I-L) ($)
								-			-	-
								-			-	-
								-			-	-
								-			-	-
								-			-	-
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								-			-	-
								-			-	-
								-			-	-
					Totals	$ -	$ -	$ -	$ -	$ -	$ -	$ -

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DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01028 – MODIFICATION REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
1. Submittals.
2. Documentation of Change in Contract Price and Contract Time.
3. Change Procedures.
4. Work Directive Change.
5. Stipulated Price Change Order.
6. Time and Material Change Order.
7. Unit Price Change Order.
8. Execution of Change Orders.
9. Correlation of Contractor Submittals.

B. Related Sections include, but are not limited to:
1. Document P520 – Agreement Form.
2. Document P700 – General Conditions.
3. Document P800 – Supplementary Conditions.
4. Section 01019 – Contract Considerations.
5. Section 01027 – Applications for Payment.
6. Section 01300 – Submittals.
7. Section 01600 – Material and Equipment.
8. Section 01700 – Contract Closeout.

1.02 SUBMITTALS

A. Submit name of the individual authorized to receive change documents and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. Change Order Forms: Engineers Joint Contract Document Committee (EJCDC) form C-941 (2018 Edition).

C. Work Change Directive Forms: Engineers Joint Contract Document Committee (EJCDC) form C-940 (2018 Edition).

1.03 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

A. Maintain detailed records of Work done on a time and material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.

B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.

1. Provide additional data to support computations: Quantities of products, labor, and equipment.
2. Taxes, insurance, and bonds.
3. Overhead and profit.
4. Justification for any change in Contract Time.
5. Credit for deletions from Contract, similarly documented.

C. Support each claim for additional costs, and for Work done on a time and material basis, with additional information:
1. Origin and date of claim.
2. Dates and times Work was performed, and by whom.
3. Time records and wage rates paid.
4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

1.04 CHANGE PROCEDURES

A. The Engineer will advise of minor changes in the Work not involving an adjustment to Contract Price or Contract Time by issuing supplemental instructions.

B. The Engineer may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications and a change in Contract Time for executing the change. Contractor will prepare and submit an estimate within seven (7) days.

C. The Contractor may propose a change by submitting a request for change to the Engineer, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01600.

1.05 WORK DIRECTIVE CHANGE

A. Engineer may issue a document, signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

B. The document will describe changes in the Work and will designate the method of determining any change in Contract Price or Contract Time.

C. Promptly execute the change in Work.

1.06 STIPULATED PRICE CHANGE ORDER

A. Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Engineer.

1.07 TIME AND MATERIAL CHANGE ORDER

A. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

B. Engineer will determine the change allowable in Contract Price and Contract Time as provided in the Contract Documents.

C. Maintain detailed records of Work done on Time and Material basis.

D. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

1.08 UNIT PRICE CHANGE ORDER

A. For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis.

B. Changes in Contract Price or Contract Time will be computed as specified for Time and Material Change Order.

1.09 EXECUTION OF CHANGE ORDERS

A. Engineer will prepare the formal Change Order document(s) and forward to Owner for signature. Engineer will then present the proposed Change Order to Owner for approval. Upon obtaining approval, the Change Order will be submitted to the Contractor for signature as provided in Conditions of Contract.

1.10 CORRELATION OF CONTRACTOR SUBMITTALS

A. Promptly revise Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price.

B. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of Work affected by the change, and resubmit.

C. Promptly enter changes in Project Record Documents.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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REQUEST FOR INFORMATION

Submitted to: Advanced Engineering and Environmental Services, LLC
4170 28th Ave S
Fargo, ND 58104

Date: _____

From: _____

Attention To: _____
Tel/Fax: _____
CC: _____

RFI #: _____
RFI Subject: _____
Spec. Referenced: _____

Project: WILLISTON WRRF REUSE PUMP STATION
AE2S Project #: P00581-2025-003

Information Requested:

Response:

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

Owner:	Owner's Project No.:
Engineer:	Engineer's Project No.:
Contractor:	Contractor's Project No.:
Project:	
Contract Name:	
Date Issued:	Effective Date of Work Change Directive:

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

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

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:		
Title:		
Date:		

EJCDC® C-940, Work Change Directive.
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CHANGE ORDER NO.: [Number of Change Order]

Owner: Owner's Project No.:
Engineer: Engineer's Project No.:
Contractor: Contractor's Project No.:
Project:
Contract Name:
Date Issued: Effective Date of Change Order:

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

Description:

[Description of the change]

Attachments:

[List documents related to the change]

Change in Contract Price	**Change in Contract Times [State Contract Times as either a specific date or a number of days]**
Original Contract Price: $ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. **[Number of previous Change Order]**: $ _____	**[Increase] [Decrease]** from previously approved Change Orders No.1 to No. **[Number of previous Change Order]**: Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: $ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] this Change Order: $ _____	**[Increase] [Decrease]** this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: $ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

Recommended by Engineer (if required)	Accepted by Contractor
By: _____	_____
Title: _____	_____
Date: _____	_____
Authorized by Owner	Approved by Funding Agency (if applicable)
By: _____	_____
Title: _____	_____
Date: _____	_____

EJCDC® C-941, Change Order EJCDC® C-941, Change Order, Rev.1.
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DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01300 - SUBMITTALS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Submittal Procedures.
2. Submittal Schedules.
3. Construction Progress Schedules.
4. Tabulation of Subcontractors.
5. Tabulation of Suppliers.
6. Request for Interpretation
7. Proposed Products List.
8. Product Data.
9. Shop Drawings.
10. Samples.
11. Color Selection
12. Test Reports.
13. Manufacturer's Certificates.
14. Manufacturer's Instructions.
15. Manufacturer's Field Reports.
16. Excessive Shop Drawing Reviews

B. Related Sections include; but are not limited to:
1. Section 01019 – Contract Considerations.
2. Section 01400 – Quality Control.
3. Section 01700 – Contract Closeout.

1.02 SUBMITTAL PROCEDURES

A. Transmit each submittal with Engineer accepted form.

B. Submittals shall be transmitted to Engineer in electronic form. Engineer will review and take appropriate action and return an electronic copy of the reviewed submittal to Contractor. Engineer and Contractor will distribute copies as necessary for their own uses.

C. Sequentially number the transmittal form. Submit revised submittals with original number and a sequential alphabetic suffix.

D. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.

E. Completely review all submittal materials prior to submission to Engineer. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

F. Schedule submittals to expedite the Project, and deliver to Engineer at business address. Coordinate submission of related items.

G. Engineer will attempt to complete a review of each submittal in a timely manner within 30 calendar days of receipt of each submittal. Failure of Engineer to review a submittal within the estimated review timeframe shall not be basis for the Contractor to request or receive additional Contract Price or Contract Time.

H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work. Highlight and/or clearly designate specific Product details and information so as to confirm Product meets or exceeds Product specifications.

I. Provide space for Contractor and Engineer review stamps.

J. When revised for resubmission, identify all changes made since previous submission.

K. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements. Clearly transmit Engineer review comments to suppliers and subcontractors as required to minimize Product delivery errors and miscommunications.

L. Submittals not requested will not be recognized or processed.

M. Engineer will review submittals in order received unless Contractor requests, in writing, a revised order of review. A revision in order may add to the length of review time required for previously submitted submittals.

N. Submittal of more than three major submittals per week may add to the required length of review time. Engineer shall notify Contractor of submittal review scheduling conflicts.

1.03 SUBMITTAL SCHEDULES

A. Submit a schedule of submittal dates for shop drawings, product data, and samples.

B. The submittal schedule shall identify specification sections and anticipated submittal dates. Indicate any critical submittals and dates for ENGINEER'S review.

C. Provide decision dates for selection of finishes and samples.

1.04 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedule in duplicate within 15 days after date of Owner-Contractor Agreement.
   1. Shall consist of items showing the various significant division of work in sufficient detail to show that the project has been reasonably preplanned.

2. Show complete sequence of construction by activity and indicating duration, and beginning and completion dates of each line item.

B. Revise and resubmit as required.
   1. Work falls 10 percent behind scheduled progress.
   2. When time extensions are approved for changes and causes beyond Contractor's Control.
   3. When Contractor feels a significant reorganization of activities becomes necessary as a result of field and material supply conditions in order to meet contract completion date of the Project

C. Submit revised schedules with each Application for Payment, identifying changes since previous version. Application for Payment will not be processed until updated construction schedule has been submitted.

D. Submit a horizontal bar chart with separate line for each major portion of Work or operation, identifying first workday of each week.

E. Sheet Size: Minimum 11x17 inches.

F. Content
   1. Project name/location number.
   2. Contractor.
   3. Duration of Project
   4. Completion date of Project.
   5. Effective starting date of schedule.
   6. Type of tabulation (initial or revised and revision number).
   7. Signature of Contractor.
   8. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction. Indicate the early and late start, early and late finish, float dates, and duration.
   9. Identify Work of separate stages and other logically grouped activities.
   10. Provide sub-schedules to define critical portions of the entire schedule, if requested by Engineer.
   11. Include conferences and meetings in schedule.
   12. Indicate estimated percentage of completion for each item of Work at each submission.
   13. Provide separate Schedule of Submittal for shop drawings, product data, and samples, and dates reviewed submittals will be required from Engineer. Allow sufficient time for review by Engineer. Indicate decision dates for selection of finishes.
   14. Coordinate content with Schedule of Values.

G. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule.

H. Distribution
   1. Distribute copies of reviewed schedules to Project Site file, Sub-Contractors, suppliers, and other concerned parties.
   2. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

1.05 TABULATION OF SUBCONTRACTORS

A. Submit a complete list of subcontractors who will provide work on the project.

B. The submitted list shall include the following information for each subcontractor:
   1. Name
   2. Address
   3. Type of work to be provided
   4. Applicable specifications sections
   5. Contact person

C. Contractor's use of specific subcontractors shall be subject to the requirements included in the specifications.

1.06 TABULATION OF SUPPLIERS

A. Submit a list of suppliers who will provide materials, equipment, or components which are integral to the Work.

B. The submitted list shall include the following information for each subcontractor:
   1. Name
   2. Address
   3. Type of work to be provided
   4. Applicable specifications sections
   5. Contact person

C. CONTRACTOR'S use of specific suppliers for providing equipment, materials, or components shall be subject to the requirements of the specifications.

1.07 REQUESTS FOR INTERPRETATION

A. Submit in writing all requests for interpretation or for information regarding the Contract Documents on the form provided by the Engineer.

B. Engineer does not guarantee that a response can be provided in the amount of time requested, but Engineer shall respond in writing to Contractor's request within a reasonable amount of time given the extent of the request for interpretation of information required.

1.08 PROPOSED PRODUCTS LIST

A. Within fifteen (15) days after date of Owner-Contractor Agreement, submit list of major Products proposed for use, with name of manufacturer, trade name, and model number of each Product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.09 PRODUCT DATA

A. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

B. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record document purposes described in Section 01700.

C. Submit one copy in electronic form or submit the up to three (3) hard copies for Contractor's use, plus three (3) copies that will be retained by the Engineer. For Products specified in Division 4 through Division 10 and Division 12 through Division 16, submit one (1) additional copy to be retained by Engineer's Sub-consultant.

D. Mark each copy to identify applicable Products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

E. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service of functional equipment and appliances.

1.10 SHOP DRAWINGS

A. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

B. After review, produce electronic and paper copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record document purposes described in Section 01700.

C. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Submit one copy in electronic form or submit the number of copies which Contractor requires (up to a maximum of six copies), plus three (3) copies which will be retained by Engineer. For Products specified in Division 4 through Division 10 and Division 12 through Division 16, submit one (1) additional copy to be retained by Engineer's Subconsultant.

E. All shop drawings shall be submitted through the Contractor in accordance with the procedures outlined in this specification. Shop drawings received from anyone other than through the Contractor will not be reviewed.

F. Shop drawings shall include data and technical drawings prepared specifically for this Project, including where required, but not limited to the following:
   1. Fabrication drawings
   2. Installation drawings
   3. Shopwork manufacturing instructions
   4. Templates or patterns
   5. Coordination drawings
   6. Schedules
   7. Design calculations

G. Shop drawings shall contain complete detail showing conformance with the Contract Documents and such other specified information as required, including but not limited to the following
   1. Related work with applicable cross references
   2. Physical configuration
   3. Dimensional information, including any variations from actual conditions
   4. List of materials
   5. Structural construction and assemblies
   6. Anchor bolt details showing type, size, embedment, and locations
   7. Machinery and equipment details
   8. Auxiliary items to machinery and equipment
   9. Protective coatings and factory finishes
   10. Electrical information including motor sizes, wiring and circuit diagrams, and instrumentation
   11. Testing results

H. Detail all connections required to complete the work.

I. Approval of shop drawings by Engineer shall not relieve the Contractor form responsibility of deviations from drawings or specification, unless deviations or changes have been brought to Engineer's attention at time of submission, nor shall it relieve the Contractor from responsibility for errors or omissions in shop drawings.

1.11 SAMPLES

A. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

B. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record document purposes described in Section 01700.

C. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing Work.

D. Include identification on each sample, with full Project information.

E. Submit the number of samples specified in individual Specification sections; one (1) of which will be retained by Engineer.

F. Reviewed samples which may be used in the Work are indicated in individual specification sections.

G. Samples will not be used for testing purposes unless specifically stated in the specification section.

1.12 COLOR SELECTION

A. Submit samples of colors and finishes for all accepted products before Engineer will coordinate the selection of colors and finishes with the Owner. Engineer will prepare a schedule of finishes that include the colors and finishes selected for both manufactured products and for surfaces to be field painted or finished and will furnish this schedule to Contractor within 60 days after the date of acceptance of the last color or finish sample.

1.13 TEST REPORTS

A. Submit for the Engineer's record and for the Owner.

B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

C. Retain one (1) copy of all test reports and results on-Site in a location accessible to Engineer.

1.14 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification sections, submit certification by the manufacturer, installation/application Subcontractor, or the Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.15 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

C. Refer to Section 01400 - Quality Control, Manufacturers' Field Services article.

1.16 MANUFACTURER'S FIELD REPORTS

A. Submit reports for the Engineer's records and for the Owner.

B. Submit report in triplicate within 30 days of observation to Engineer for information purposes.

C. Submit the manufacturer’s field reports for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

1.17 EXCESSIVE SHOP DRAWING REVIEWS

A. The maximum number of submittal reviews for any one product or specification section shall be two (2).

B. Compensation for third or subsequent reviews will be required as outlined below:
1. Owner will compensate Engineer for “additional services”.
2. Owner will deduct amount of such compensation from payment to Contractor.
3. Engineer’s compensation shall be at Engineer’s standard hourly rates, plus reimbursable expenses at cost.

1.18 ERECTION DRAWINGS

A. Submit drawings for the Engineer's benefit as contract administrator or for the Owner.

B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

C. Data indicating inappropriate or unacceptable work may be subject to action by the Engineer or Owner.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01400 - QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
1. Quality Assurance - Control of Installation.
2. Tolerances.
3. References and Standards.
4. Testing Responsibilities
5. Testing Services.
6. Mill Tests
7. Factory Tests
8. Manufacturer's Instructions
9. Manufacturer's Certificates
10. Manufacturers' Field Services.
11. Qualification Tests
12. Laboratory Tests
13. Product Field Tests
14. Materials Field Tests
15. Coatings Field Tests

B. Related Sections include; but are not limited to:
1. Section 01300 – Submittals.
2. Section 01600 – Material and Equipment.

1.02 QUALITY ASSURANCE - CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, Site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturer's instructions, including each step in sequence.

C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on Contract Drawings, shop drawings, or as instructed by the manufacturer.

G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust Products to appropriate dimensions; position before securing Products in place.

1.04 REFERENCES AND STANDARDS

A. For Products or workmanship specified by association, trade, or other consensus standard, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by code.

C. Obtain copies of standards where required by Product specification sections.

D. Neither the contractual relationships, duties, nor responsibilities of the parties in Contract nor those of the Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 TESTING RESPONSIBILITIES

A. Contractor’s Responsibility:
   1. Contractor shall be responsible for all quality control testing or inspections including mill tests, factory tests, qualification tests, laboratory tests, and field tests.
   2. The independent firm will perform inspections, tests, and other services specified in individual specification Sections and as required by the Engineer.
   3. Quality control required by codes or ordinances, or by the plan approval authority, unless otherwise provided in the Contract Documents.
   4. Contractor’s convenience testing.
   5. Coordinate with each independent agency to accommodate required services with minimum delay in progress of work, and to avoid moving or replacing work. Schedule times for quality control services.
   6. Cooperate with independent agencies performing required quality control services. Notify testing agency sufficiently in advance of operations to permit assignment of personnel. Provide auxiliary services as required, including, but not limited to the following:
      a. Providing access to work
      b. Taking samples or assistance with taking samples
      c. Delivery of samples to testing laboratories
      d. Security and protection of samples and test equipment at Site

B. Owner's Responsibility:
   1. Owner responsible quality control shall be specifically indicated. If quality control measure is not indicated as Owner responsibility it is the Contractor's responsibility.

C. Retesting Responsibility:
   1. Where results of quality control prove unsatisfactory and do not indicate compliance with Contract Documents all costs associated with retesting is the Contractor's responsibility.

D. The costs for retesting of Owner responsible quality control shall be deducted from the Contract amount by supplemental agreement.

1.06 TESTING SERVICES

A. Contractor shall appoint, employ, and pay for specified services of an independent firm to perform testing including:
   1. Embedment and backfill materials.
   2. Moisture-density (Proctor) and relative density tests on embedment and backfill materials. Quantity determined by Engineer.
   3. In-place field density tests on embedment and backfill materials. Quantity determined by Engineer.
   4. Bacteriological testing.
   5. All other tests and engineering data required for Engineer's review of materials and equipment proposed to be used in the Work. Contractor shall obtain Engineer's acceptance of the testing firms before having services performed, and shall pay all costs for these testing services.

B. The independent firm will perform tests, at the frequency listed in individual Specification Sections, and other services specified in individual Specification Sections and as required by the Engineer.

C. Testing and source quality control may occur on or off the Site. Perform off-Site testing as required by the Engineer or the Owner.

D. Reports will be submitted by the independent firm to the Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
   1. Notify Engineer and independent firm 48 hours prior to expected time for operations requiring services.
   2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

F. Testing does not relieve Contractor from performing Work according to Contract requirements.

G. Re-testing required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Engineer. Payment for re-testing will be paid by the Contractor.

H. Select independent testing agency qualified in accordance with referenced ASTM standards and that is acceptable to the Engineer, if required for certain types of testing.

I. Comply with pertinent codes, regulations, and industry standards except when more stringent standards or tolerances are specified.

1.07 MILL TESTS

A. Mill or shop tests shall be conducted and test reports submitted where this type of test is specified.

B. Mill or shop tests shall be accomplished by the manufacturer or fabricator of the materials. Mill tests may be conducted by an independent testing laboratory. These tests shall be performed in accordance with applicable ASTM standards.

1.08 FACTORY TESTS

A. Factory tests of process, mechanical, and electrical equipment relative to performance, capacity, rating, efficiency, or other such requirements shall be conducted in the factory or shop for each item supplied when this type of test is specified.

B. Factory testing shall be performed in accordance with applicable standards and test codes.

C. Where factory tests are required or specified, reports of the test results shall be submitted to Engineer for approval prior to shipment. Submit the number of test reports for approval required by the Contractor plus four (4) copies to be retained by the Engineer.

D. Factory observation of fabrication procedures, materials used, and testing methods may be performed by a representative of the Owner or Engineer. Owner shall pay for factory observation.

1.09 MANUFACTURERS' INSTRUCTIONS

A. Comply with manufacturer's instructions in full detail for storage, installation, assembly, installation, start-up, and adjustment. Follow appropriate sequencing as recommended by manufacturer.

B. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer prior to proceeding.

C. If required by individual product or equipment specification sections, submit manufacturer's printed instructions prior to assembly and installation.

1.10 MANUFACTURERS' CERTIFICATES

A. Submit manufacturer's certificate indicating that products meet or exceed specified requirements where required in the individual specification sections.

B. Certificates shall be submitted prior to shipment of equipment or products.

1.11 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and other services as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer subject to approval of Engineer.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. Refer to Section 01300 – Submittals.

1.12 QUALIFICATION TESTS

A. Should a product, material, or method for assembly of unknown or questionable quality to the Engineer be proposed by the Contractor, additional tests may be required by the Engineer.

B. Additional testing as required by the Engineer shall be used as a basis to establish acceptance or rejection.

1.13 LABORATORY TESTS

A. Laboratory tests shall be conducted and test reports shall be submitted where this type of test is specified. All laboratory tests shall be made by an independent laboratory approved by the Engineer. These tests shall be performed in accordance with applicable ASTM standards.

B. Laboratory tests may be witnessed by representatives of the Owner or Engineer.

C. Submit two (2) copies of all laboratory tests to the Engineer for record.

1.14 PRODUCT FIELD TESTS

A. Product field tests shall be set up and completed by the Contractor. Provide all tools, equipment, instruments, personnel, and other facilities required for the completion of each test.

B. Product field tests of process equipment, mechanical systems, electrical systems, piping systems, and similar facilities shall be conducted where this type of test is specified.

C. Product field tests include the determination of performance, capacity, efficiency, function, tightness, leakage, and other special requirements. Product field tests shall be performed in accordance with applicable standards and test codes.

D. Product field tests may be witnessed by representatives of Owner and Engineer.

E. Submit two (2) copies of all product field tests to the Engineer for record.

1.15 MATERIALS FIELD TESTS

A. Routine tests of materials incorporated into the Project will be performed by an independent testing laboratory arranged and paid for by the Contractor and acceptable to the Engineer.

B. Results of materials field testing shall be reported to the Engineer and Contractor.

C. Material field tests may be witnessed by representatives of the Owner, Engineer, and Engineer's subconsultant and such witnessing shall be paid for by the Contractor.

D. Provide at least two different certified gradation tests from each source of materials provided for the project site. Certified gradation tests shall be done in accordance with ASTM C136 and be performed by the independent testing laboratory hired by the Contractor.

E. Provide at least two (2) different certified moisture-density relationship (compaction curve) tests from each source of materials provided to the project site. Certified moisture-density relationship tests shall be done in accordance with ASTM D698 and be performed by the independent testing laboratory hired by the Contractor.

F. Provide notification for scheduling of required field testing and assist in coordination with independent testing laboratory.

1.16 COATINGS FIELD TESTS

A. Engineer's sub-consultant or an independent testing company hired by the Owner will provide testing of coatings and coating systems. Pay for testing of coatings and coating systems.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate preparation, primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

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DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01600 – MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
1. Products.
2. Transportation and Handling.
3. Storage and Protection.
4. Product Options.
5. Substitutions.

B. Related Sections include, but are not limited to:
1. Document P200 – Instruction to Bidders.
2. Document P700 – General Conditions.
3. Document P800 – Supplementary Conditions.
4. Section 01300 – Submittals.
5. Section 01400 – Quality Control.

1.02 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the Work. Products may also include existing materials or components designated for re-use.

B. All products that may come into contact with water intended for use in a public water system shall meet American National Standards Institute (ANSI)/National Sanitation Foundation (NSF) International Standards 60 and 61, as appropriate. A product will be considered as meeting these standards if so certified by NSF, the Underwriters Laboratories, or other organization accredited by ANSI to test and certify each product.

C. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

D. Provide interchangeable components of the same manufacturer for components being replaced.

1.03 TRANSPORTATION AND HANDLING

A. Transport and handle Products in accordance with manufacturers' instructions.

B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

A. Store and protect Products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to Product.

D. For exterior storage of fabricated Products, place on sloped supports above ground.

E. Provide bonded off-Site storage and protection when Site does not permit local storage or protection.

F. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.

G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.05 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with an option for an “Approved Equivalent” Manufacturer: Submit a request for the “approved equivalent” in accordance with the following article.

1.06 SUBSTITUTIONS

A. “Approved Equivalent” products will be considered only if written request is made at least 15 days prior to bid opening.

B. Substitutions will be considered only when a Product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that the Bidder/Contractor:
   1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
   2. Will provide the same warranty for the Substitution as for the specified Product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
   5. Will reimburse Owner and Engineer for review or redesign services and associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:
   1. Submit three copies of request for consideration. Limit each request to one proposed Substitution.
   2. Submit shop drawings, product data, and certified test results attesting to the proposed Product equivalence. Burden of proof is on proposer.
   3. The Engineer will notify Contractor in writing of decision to accept or reject request.
   4. Accepted substitutions will be listed by addendum.

PART 2 PRODUCTS

2.01 UNIFORMITY

A. For any type of similar equipment, i.e., motors, drive units, etc., provide equipment of the same manufacturer.

B. Inform all subcontractors and suppliers of the selected manufacturers to ensure equipment uniformity.

2.02 TOOLS

A. For any equipment or equipment components furnished, requiring special tools, the supply the Owner with such tools to allow for the maintenance and removal/replacement of equipment components.

2.03 CONSUMABLES

A. Provide Owner with all consumable items that are required during start-up and initial operation (90 days minimum).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install all equipment in full compliance with the manufacturers' recommendations.

B. Obtain services of qualified and approved factory representatives to install, check, and approve the installation of all equipment as specified in individual Sections.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01700 – CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Closeout Procedures.
2. Substantial Completion.
3. Final Completion.
4. Final Cleaning.
5. Adjusting.
6. Project Record Documents.
7. Spare parts and Maintenance Products.
8. Warranties and Bonds.
9. Maintenance Service.
10. Final Adjustments of Account.

B. Related Sections include; but are not limited to:
1. Section 01300 – Submittals.

1.02 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.

B. Provide submittals to Engineer that are required by governing or other authorities.

C. Submit Final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

D. Owner will occupy all portions of the Project.

1.03 SUBSTANTIAL COMPLETION

A. Prior to substantial completion review Contract Documents for items which are not complete or need to yet be completed including submittal of all manuals, and testing reports. Make a list of incomplete work, a value of the incomplete work, and reasons why work is incomplete. Complete all items required to be completed as part of substantial completion.

B. Provide a written notice to Engineer that the work, or specific portions of the work, is substantially complete and ready for review. If there are any items remaining to be corrected or completed submit a list of these items along with the notice of substantial completion. Along with the list of items provide a written explanation of why these items are not considered necessary for substantial completion.

C. Upon receipt of Contractor's notice of substantial completion, Engineer will proceed with inspection for substantial completion.

D. Following the substantial completion inspection by the Engineer and Engineer's sub-consultants, Engineer will either prepare certificate of substantial completion, or notify the Contractor in writing that substantial completion has not been meant listing the various reasons.

E. Promptly complete the items required to meet substantial completion and submit a second notice of substantial completion to the Engineer.

F. Engineer will review the work a second time to determine the status of substantial completion.

G. When Engineer considers the project to be substantially complete, Engineer will prepare the preliminary certificate of substantial completion along with a substantial completion punch list of items to be completed prior to final payment. Engineer will deliver preliminary certificate and punch list to Owner and consider any objections by the Owner as provided in the Conditions of the Contract.

H. Upon agreement by Owner and Engineer of substantial completion and punch list items, Engineer will execute and deliver to the Contractor and Owner a final certificate of substantial completion along with substantial completion punch list of items to be completed prior to final payment.

I. A maximum of two (2) reviews of substantially complete work will be completed by Engineer and Engineer's sub-consultants for any one portion of work under the Contract. Should a third or subsequent reviews be necessary the following requirements will be met:
   1. Owner will compensate Engineer for additional reviews.
   2. Owner will deduct the amount of compensation paid to the Engineer for additional reviews from the payment to the Contractor.
   3. Compensation shall be at Engineer's standard hourly rates plus actual cost of reimbursables.

1.04 FINAL COMPLETION

A. Following substantial completion Contractor shall complete remaining work and items to be corrected as part of substantial completion punch list as well as final cleaning and transferring site to Owner.

B. When Contractor considers that all work is complete, Contractor shall provide written notice of final completion to Engineer.

C. Following receipt of final completion certification, Engineer and Engineer's sub-consultants shall review the work to verify that the requirements for final completion have been met.

D. Upon review of work for final completion Engineer will either request the Contractor to make closeout submittals or will notify Contractor that the work is

not complete with a list of incomplete or defective work. Promptly take steps to correct all listed deficiencies and incomplete work before sending a second written notice of final completion certification to Engineer.

E. If final completion was not met following first review, Engineer will review work a second time to determine if the requirements for final completion have been met.

F. A maximum of two (2) reviews of final complete work will be completed by Engineer and Engineer's sub-consultants for any one portion of work under the Contract. Should a third or subsequent reviews be necessary the following requirements will be met:
   1. Owner will compensate Engineer for additional reviews.
   2. Owner will deduct the amount of compensation paid to the Engineer for additional reviews from the payment to the Contractor.
   3. Compensation shall be at Engineer's standard hourly rates plus actual cost of reimbursables.

G. When Engineer considers all work to be complete in accordance with the Contract Documents, Engineer shall request the Contractor to make closeout submittals.

1.05 FINAL CLEANING

A. Execute final cleaning prior to final Work assessment.

B. Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains, and foreign substances, polish transparent and glossy surfaces, clean all floors in areas where Work was performed.

C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

D. Replace filters of operating equipment as provided for in the Contract Documents.

E. Clean debris from horizontal surfaces and drainage systems.

F. Clean Site; sweep paved areas and rake clean landscaped surfaces affected by Work.

G. Remove waste and surplus materials, rubbish, and construction facilities from the Site.

1.06 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.07 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents and record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed Shop Drawings, Product Data, and Samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling current and future reference by Owner and Engineer.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
   1. Manufacturer's name and Product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract drawings.

G. Submit documents to Engineer with claim for Final Application for Payment.

1.08 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra Products in quantities specified in individual specification Sections.

B. Deliver to Site and place in location as directed by Owner; obtain receipt prior to final payment.

1.09 WARRANTIES AND BONDS

A. Provide duplicate notarized copies.

B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in D size three ring binders with durable plastic cover.

D. Submit prior to final Application for Payment.

E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

1.10 MAINTENANCE SERVICE

A. Furnish service and maintenance of components during the warranty period.

B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

D. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

1.11 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to Engineer. Statement shall reflect all adjustments to the contract sum and include the following:
   1. Original contract sum.
   2. Additions and deductions resulting from:
      a. All previous change orders
      b. Allowances
      c. Unit prices
      d. Deductions for uncorrected work
      e. Penalties and bonuses
      f. Deductions for liquidated damages
      g. Deductions for multiple reviews
      h. Other adjustments
   3. Total contract sum as adjusted.
   4. Previous payments.
   5. Sum remaining due.

B. Engineer will prepare a final change order, reflecting approved adjustments to the contract sum which were not previously made by change orders.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used.

END OF SECTION

DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01730 – OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
1. Quality Assurance.
2. Format.
3. Contents of Each Volume.
4. Manual for Equipment and Systems.
5. Instruction of Owner's personnel.
6. Submittals.

B. Related Sections:
1. Section 01300 – Submittals.
2. Section 01400 – Quality Control.
3. Section 01600 – Material and Equipment.
4. Section 01700 – Contract Closeout.

1.02 QUALITY ASSURANCE

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.03 FORMAT

A. Prepare data in the form of an instructional manual. Arrange data in numerical format.
1. Binders:
a. Commercial quality, 8-1/2 x 11 inch D-size three ring binders with durable plastic covers.
b. 2-inch maximum ring size.
c. When multiple binders are used, correlate data into related consistent groupings.
2. Cover Identify:
a. Each binder with typed title OPERATION AND MAINTENANCE INSTRUCTIONS.
b. Title of Project.
c. Subject matter of contents.
d. Volume number.
e. Year of construction.
3. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

B. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

C. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages. Folded paper should be completely viewable without removal from binder.

D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.
      d. Photocopies of warranties.
      e. Bonds.

E. USB Flash Drive:
   1. USB Flash Drives shall be provided with all documents included with an index, tabs, and labels as previously required for the Binders.

1.04 CONTENTS OF EACH VOLUME

A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Engineer, Sub-consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: List names, addresses, and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems and to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

E. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01400.

F. Warranties: Prepare and submit per Section 01700.

G. Bonds: Prepare and submit per Section 01700.

H. USB Flash Drive: A flash drive shall be provided with all volume contents in electronic format or scanned to a portable document file (.pdf). The documents shall be placed as required under the appropriate tabs and labels as previously required for the compact discs. Each file shall be adequately labeled to identify the contents without opening the document.

1.05 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

B. Panelboard Circuit Directories: Provide typewritten electrical service characteristics, controls, and communications. Refer to applicable Division 16 specification Sections.

C. Include color-coded wiring diagrams as installed. Refer to applicable Division 16 specification Sections.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Provide control diagrams by controls manufacturer as installed.

K. Provide Contractor's coordination drawings, with color-coded piping diagrams as installed.

L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

M. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage, and local sources of supply.

N. Additional Requirements: As specified in individual Product specification Sections.

O. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

1.06 SUBMITTALS

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before Substantial Completion. Engineer will review draft and return one copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

C. Submit two (2) copies of completed volumes fifteen (15) days prior to final inspection. One copy will be returned after final inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.

D. Submit four (4) sets of revised final volumes in final form within ten (10) days after final inspection.

E. Submit a minimum of two (2) complete copies of the flash drives with final documents in electronic format within (10) days after final inspection.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used.

END OF SECTION

DIVISION 02
SITEWORK

DIVISION 2 – SITEWORK

SECTION 02608R – PREFABRICATED PUMP STATION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes prefabricated underground vaults constructed of steel, fully assembled, and consisting of, but not limited to, the following components:

1. Entrance hatch and stairs.
2. Insulation.
3. Pumps, piping, valves, meters, and associated appurtenances.
4. Sump, and associated discharge piping.

B. Related Sections include, but are not limited to:

1. Section 01025 – Measurement and Payment
2. Section 01300 – Submittals
3. Section 01600 – Material and Equipment
4. Section 01730 – Operation and Maintenance Data

C. Owner shall contract with a single manufacturer to procure the prefabricated underground vault constructed of steel. Installation of the vault structure and placement into operation shall be completed by others.

D. Manufacturer shall take note that prefabricated vault(s) are to be delivered with all process and electrical equipment installed as noted on engineer's drawings. Separate on site contractors are to perform all work associated with connections of exterior equipment to the vault including but not limited to process pipe connections, utility service installation, vault grounding electrode system and catholic protection system as required for a fully operational facility to the standards of the owner/engineer.

E. The Pump Station Manufacturer/Supplier shall ship and deliver the premanufactured pump station and appurtenances to the project site as a single unit with all major components fully installed to the greatest extent possible.

1.02 REFERENCES

A. References include, but are not limited to:

1. STI – Steel Tank Institute.
2. ACI – American Concrete Institute.
3. ASTM A36 – Structural Steel.
4. AWS – American Welding Society.

5. AWWA C207 – Steel Pipe Flanges for Waterworks Service – Sizes 4 in. through 144 in.
6. ANSI/AWWA C105/A21.5: Polyethylene Encasement for Gray and Ductile Cast-Iron Piping for water and other liquids.
7. AWWA C219: Bolted, Sleeve-Type Couplings for Plain-End Pipe.
8. AWWA C600-99: Installation of Ductile-Iron Water Mains and Their Appurtenances.
9. AWWA C606: Grooved and shouldered type joints.
10. AWWA C653-97: Disinfection of Water Treatment Plants.
11. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
12. Federal Specification SS-S-00210 - Pre-formed Plastic Sealing Compound.
13. NFPA NO. 70 - NATIONAL ELECTRIC CODE, 2017 Edition.
14. UL508A Standard – Industrial Control Panels.
15. All applicable local laws, rules and wiring standard for the state of which work is to be performed.
16. submittals for review

B. Submittals per Section 01300 – Submittals.

C. Shop Drawings: Submit shop drawings in accordance with Section 01300 for all items that are to be included as part of the premanufactured pump station package as outlined in these specifications. Indicate equipment types, locations, dimensions, piping, and conduit, sizes and elevations of penetrations. Shop Drawings shall be submitted to the Engineer for approval and shall include the following:

1. Details of the pump station steel vault, process piping and valves, pumps, flow meters, vault penetrations, stairs, ladders, hatches, hoist and rail system, coatings, sump pump, heating, dehumidification, electrical and control systems, and all related appurtenances.
2. Calculations for the steel vault structure including the ceiling, wall, floor, penetrations, and foundation support systems and take into consideration the soil conditions, bury depth, ground water conditions, and other applicable factors.
3. Calculations shall indicate that the foundation system has been designed to resist potential buoyancy forces with an applicable factor of safety.
4. All steel vault and foundation system calculations and submittals shall be signed and sealed by a professional engineer licensed in the State of North Dakota that takes full responsibility for all steel vault and foundation system design and construction elements.

D. Product Data: Provide detailed specifications, drawings, and data covering all materials, parts, devices, equipment, and other accessories forming part of

equipment for the complete operational system. Electrical and controls submittals shall include the following minimum:

1. Panel and control system drawings including system schematic drawings, terminal numbering, device component schematic drawings, dimension drawings, layout drawing and nameplate schedule.
2. Overall system diagram showing all components, converters, cables and connectors.
3. Proposed manufacturer component catalog data cut sheets with model numbers proposed for use clearly identified.

E. Operations and Maintenance Data: Submit on all parts, devices, equipment and other accessories forming each complete operational system. Electrical and controls portion shall include the following minimum:

1. Panel equipment (if applicable), field devices and instruments, including “as-built” system schematics. All items requested as part of the shop drawing submittals above, shall be included in their “as-built” form.

F. Vault manufacturer shall submit required electrical documents and application noted in Part 2 of this specification to North Dakota State Electrical Board for approval and provide documentation of Electrical Inspector approval to engineer prior to shipping vault to project site(s).

1.03 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with a minimum of three years’ experience.

1.04 QUALITY ASSURANCE

A. Manufacturer: Each vault shall be designed, fabricated, assembled, and tested in house by the vault manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Box, crate, or otherwise completely enclose and protect all equipment during shipment, handling and storage.

B. Protect equipment from exposure to elements and keep all items thoroughly dry.

C. Primed or Painted Surfaces: Protect against impact, abrasion, discoloration, and other damage.

D. Protect electrical equipment, controls, and insulation against moisture or water damage.

E. In the event that components cannot be fully installed at the factory due to shipping restrictions, it is the responsibility of the manufacturer to ensure all items

are installed per engineer's drawings and specifications in the field for a fully functioning system at no extra expense to the Owner.

1.06 PAINTING AND IDENTIFICATION SYSTEMS

A. All material and equipment shall be factory coated and painted. Stainless steel components shall not be painted.

B. Refinish or restore to original appearance, all equipment that has sustained damage to the manufacturer's finish and prime coats of paint or enamel.

1.07 REGULATORY REQUIREMENTS

A. Not Used.

1.08 WARRANTY

A. The pump station manufacturer/supplier shall warrant that the entire pump station, appurtenances, and all equipment therein being supplied to the Owner against defects in design, workmanship, and materials for a period of two (2) years, from the date of start-up not to exceed 30 months from the date of shipment, under normal use, operation and service. The warranty shall be in printed form and shall apply to all units. No prorated warranty will be accepted. Station and equipment removal, shipping and reinstallation will be covered under this warranty.

PART 2 PRODUCTS

2.01 GENERAL

A. Provide factory designed and assembled steel vault with all necessary piping, valves, meters, electrical circuiting, electrical controls and appurtenances as required by the Engineer's Plans and Specifications. Note that not all accessories and equipment may be included in these specifications or shown on the Drawings. Pump station Manufacturer shall furnish and install all equipment, accessories, and appurtenances required to provide a complete and functional system as shown on the Drawings and included within these Specifications.

B. Approved Manufacturers:

1. Dakota Pump, Inc.
2. Dakota Pump and Control (USEMCO)
3. Engineered Fluid, Inc. (EFI)
4. Approved Equivalent.

2.02 STEEL VAULTS

A. Structural steel plate that meets or exceeds ASTM A36/A36M.

B. Wall Thickness:

1. Vertical Walls: 3/8” minimum.
2. Top and Bottom: 3/8” minimum.
3. The steel vault and its roof and foundation systems shall be designed by the prefabricated pump station supplier for the proposed field conditions as shown on the Drawings and as included in these specifications including proper wall, ceiling, and floor thicknesses for the proposed bury depth, groundwater conditions, and other site conditions.

C. Joints: Continuously welded and watertight. Welds shall be tested with a dye penetrant to assure the watertight integrity of the welds.

D. Pipe penetrations through walls and ceiling shall be water-tight.

E. Lifting Eyes shall be provided within the top reinforcements of the chamber to facilitate lifting and handling.

F. The vault shall include a rail, hoist, and trolley system that is permanently attached to the roof and is capable of lifting each of the three (3) pumps and moving them to the overhead equipment hatch. Pump station supplier shall size and design the rail, hoist, and trolley system and install in the prefabricated pump station.

G. Entrance Manway with Stairs and Equipment Hatch:

1. Cover:
   a. Material: 11-gauge aluminum.
   b. Depth: 12’’
   c. Formed with a 5-1/2” flange with 7/16” holes provided for securing to angle framing on top of the vault.
   d. Insulation: 3” thick concealed insulation.
   e. Draft Seal: Full perimeter heavy extruded EPDM rubber gasket to insure watertight seal.
2. Performance Characteristics:
   a. Cover shall be reinforced to support a minimum live load of 40 psf with a maximum deflection of 1/150th of the span or 20 psf wind uplift.
   b. Cover shall be equipped with an automatic hold open arm complete with red vinyl grip handle to permit easy, one hand release.
   c. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of the opening and closing.
   d. Operation of the cover shall not be affected by temperature.
   e. Manway shall be weather tight and watertight with fully welded joints.
3. Hardware:
   a. Heavy pintle hinges shall be provided.
   b. Lifting Mechanisms:

1) Operators: Compression spring operators enclosed in telescopic tubes.

2) The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe.

3) For aluminum construction; welded to the curb assembly. For steel construction; through-bolted to the curb assembly.

c. Hold-open Arm: Automatic hold-open arm that engages a lock open device when the cover is in the 90-degree full open position.
d. Exterior padlock hasp.
e. Entrance lock: Slam Latch (2 point); Inside and Outside Handles with Padlock Hasps
f. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed. Springs shall have an electrocoated acrylic finish for corrosion resistance.
g. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

4. Entrance Staircase:
   a. An entrance staircase shall be provided and conform to OSHA specifications.
   b. The maximum angle of the staircase to the floor shall be 50 degrees.
   c. The stairs shall extend to within 2” from the top of the entrance manway.
   d. A handrail shall be provided on each side of the staircase inside the station chamber.
   e. Minimum headroom above each step shall be 84”.
   f. Staircase shall have a minimum of 36” of free space in front of bottom step and shall not interfere with access to equipment inside the vault.
5. Equipment Manway:
   a. Size: 30’’ x 96’’.
   b. Approved Manufacturer
      1) Bilco Model L-50TB Thermally Broken Roof Hatch
      2) Approved Equivalent

6. Equipment Manway Ladder:
   a. Provide an OSHA approved ladder that extends from the pump station floor to the ceiling, just below the equipment manway hatch opening.
   b. The ladder shall be constructed of aluminum and be securely attached to the floor and wall of the pump station.

c. A Bilco Ladder Safety Post (Model LU-1) with yellow powder coat or equivalent shall be furnished and installed at the top of the ladder.

H. Welding

1. Welding shall be in accordance with standard AWS practices with proper fillet section and continuity to assure a sound, watertight structure.
2. Welds shall be sound and free from embedded scale or slag, shall have tensile strength across the weld not less than that of the thinner of the connected sections, and shall be watertight.
3. Butt welds shall be used for all welded joints in line pipe assemblies.
4. Fillet welds shall be used for flange attachment in accordance with AWWA C207.
5. Pipe and fittings shall be welded by welders certified for ASME type IX pipe welding.

I. Anchoring/Hook Points

1. Each vault shall contain a minimum of four (4) anchoring points to connect vault to concrete base slab. Anchoring connections shall be evenly spaced and made as detailed on the Drawings, and as specified in paragraph 3.04.B of the Section herein.

J. Protective Coating

1. Mill scale, rust, weld flux and other foreign matter shall be removed from all steel surfaces by sandblasting to SSPC-SP 10/NACE No.2 specification for near-white blast cleaning.
2. Remove surface irregularities by grinding.
3. Interior and exterior surfaces shall receive a minimum of two coats of hi-build epoxy coating. Interior color to be selected by Owner during the submittal review process.
4. The interior shall receive two coats a minimum of 3 mils each to a total of 6 mils dry.
5. The exterior shall receive two coats a minimum of 4 mils each to a total of 8 mils dry.
6. Paint touch-up kits shall be provided with the station for coating areas damaged in shipping.

K. Insulation

1. Cover entire top, riser, vertical walls and exterior of vault, and access hatch with urethane foam insulation (after coating the vault exterior) to R-19 insulating value with two component closed cell urethane foam. Coat per manufacturer’s directions.
   a. Approved Insulation

1) Foam Enterprises FE 303-2.5 HCP.

2) Approved Equivalent.

2. Coat exterior of insulation with water emulsive or elastomeric acrylic coating per manufacturer's directions.
   a. Approved emulsive coating (Applied at 3 gallons per 100 square feet)
      1) Tremco Tremproof 60.

      2) Approved Equivalent

   b. Approved elastomeric acrylic coating
      1) BASF FE COAT 1000

2.03 VAULT ACCESSORIES

A. Sump

1. Each vault shall be provided with an integral sump, a minimum 18" in diameter as indicated on the Drawings.

B. Sump Pump

1. Each vault shall be provided with a minimum of one (1) sump pump as indicated on the drawings.
   a. 1/2 Horsepower,115 Volt, 60 cycles with minimum 8' plug whip length.
   b. Integral mounted float/activation switch.
   c. Capable of pumping 40 gpm at 15 feet of head.
   d. 1.25" Discharge, with check valve mounted within 1' of discharge.
   e. Place drainback tee and return line 1-foot from ceiling of vault. 1.25' tee with 1.25" by 0.5" spigot x socket bushing and 0.5" schedule 40 PVC sump return line. Drainback line shall have a valve near the tee with the sump surface discharge line.
   f. Approved Manufacturer
      1) Zoeller model 53
      2) Approved Equivalent

C. Ventilation System

1. A ventilating system shall be provided to maintain a fresh air system in the equipment chamber.
2. The exterior exhaust duct shall be fabricated of schedule 40 steel pipe terminating above grade in a screened 180-degree elbow or vent cap for protection against weather and foreign objects.
3. An inlet air duct shall be provided to direct air to within 18 inches of the station floor. A 180-degree return bend or vent cap with insect screen shall be provided at the inlet.

4. Inlet and exhaust ducts shall extend 4’-0” above finished grade.

D. Heater

1. The equipment chamber shall be provided with 240V, 1Ø, 3000-watt electric heater(s).
2. Quantity shall be as shown on Electrical Drawings.
3. The heater shall be of the fan-forced type, with fan delay, and complete with an integral, automatic, snap action thermostat.
4. Fan motor is to be totally enclosed and impedance protected.
5. The heater shall be wall mounted, with an 18-gauge steel grille surface-mounting frame.
6. Heater shall be hard wired into the station electrical system, provide equipment disconnect per NEC.

E. Dehumidifier

1. A packaged dehumidifier assembly with hermetically sealed Freon refrigeration type compressor, expansion coil, fan and condenser coil shall be furnished to maintain the relative humidity of the air to prevent condensation on the walls.
2. The dehumidifier shall be controlled automatically by an adjustable humidistat located on the dehumidifier.
3. A low-temperature thermostat shall be provided.
4. The dehumidifier shall be housed in a heavy steel enclosure securely fastened to the wall of the station.
5. The condensate shall be drained to the station sump.
6. The dehumidifier shall have a capacity of 24 pints per 24 hours at 80 degrees F and 60% relative humidity.
7. The dehumidifier performance shall be as certified by the Association of Home Appliance Manufacturers.

2.04 CATHODIC PROTECTION

A. It is the responsibility of the vault manufacturer to provide calculations and adequate protection of the vault based on its size from corrosion through the use of magnesium anode packs. Anode packs to be furnished by the vault provider and installed in the field by the electrical contractor.

B. Provide a minimum of

1. Four (4) anode packs for vaults up to 12’ long.
2. Six (6) anode packs for vaults up to 20’ long.
3. Eight (8) anode packs for vaults longer than 20’.

C. Place vertically in the ground at evenly spaced intervals around the centerline of the equipment chamber.

D. The bottom end of the anodes shall be at the same elevation as the equipment chamber base and approximately five (5) feet from the structure.

E. A NEMA 4X junction box with padlock hasp shall be installed above grade on an exhaust/inlet pipe as shown on engineer's drawings and the anode leads shall be wired to a terminal strip in the junction box.

F. Mount an anode tester with controls installed in a NEMA 4X enclosure and wired within the vault.

G. Provide an ammeter with a range of 0 – 25 milliamps to allow current readings of each anode.

H. Provide adjustable resistors connected in series with each anode circuit independently for current adjustment.

I. The tester shall be equipped with spring loaded "test-normal" switches for each anode.

2.05 STEEL PIPE AND FITTINGS

A. Steel pipe shall be used in Steel Vaults and shall conform to the following:

1. Sizes: 10-inches and smaller.
   a. Material: Schedule 40, seamless steel manufactured in accordance with the dimensional tolerances and material specifications of AWWA C200 for steel pipe and steel butt-welded fittings. All pipe and fittings on the suction side of the pumps shall have a minimum pressure rating of 200 psi. All pipe and fittings on the discharge side of the pumps shall have a minimum pressure rating of 300 psi. All pipe and fitting flange ratings and bolt patterns shall be in accordance with the pressure rating requirements and mate with adjoining flanges.
2. On-site inspection by Contractor of all materials.
3. Pipe Coatings and Linings:
   a. Coatings and Linings: Apply a primer and two coats of liquid epoxy (4 to 6 mils per coat) per manufacturer's standards. Exterior coating may be shop or field applied. Touch up damage to any coatings prior to start-up.
4. All materials shall be new and unused. Manufacturer shall take preventative measures against corrosion for all steel materials via epoxy lining selected and/or cathodic protection.

2.06 PROCESS PIPE AND FITTING ACCESSORIES

A. Compression Couplings

1. Ductile iron followers and middle rings conforming to ASTM A536, Grade 65-45-12.

2. NSF 61 fusion bonded powder epoxy coating.
3. Testing per AWWA C219 (AWWA C111/A21.11).
4. Rating to 200 psi working pressure per AWWA C219.
5. Gaskets: Conforming to compression set test ASTM D395 Method A & B, approved for water applications.

B. Flanged Coupling Adapters

1. Ductile iron followers and middle rings conforming to ASTM A536, Grade 65-45-12.
2. NSF 61 fusion bonded powder epoxy coating.
3. Testing per AWWA C219 (AWWA C111/A21.11).
4. Rating to 200 psi working pressure per AWWA C219.
5. Gaskets: Conforming to compression set test ASTM A395/A395M Method A & B, approved for water applications.

2.07 PIPE SUPPORTS

A. Provide a complete system of pipe supports, expansion joints, and anchors for piping in accordance with the requirements set forth herein. Additional pipe supports may be required adjacent to expansion joints, couplings, valves, or as requested by the Engineer.

B. All piping shall be rigidly supported and anchored so that there is no movement or visible sagging between supports.

1. Minimum vertical Adjustment: 4 ½”.
2. Provide complete with riser pipe and flange bolts for floor mounting.

C. Materials

1. Pipe supports shall be fabricated of manufacturer’s standard materials and provided with manufacturer’s standard finish.
2. Design loads for inserts, brackets, clamps, and other support items shall not exceed the manufacturer’s recommended loads.
3. Pipe supports shall be manufactured for the sizes and types of pipe to which they are applied.
4. Unless otherwise acceptable to the Engineer, the use of supports that rely on stressed thermoplastic components to support the pipe will not be acceptable.
5. Concrete inserts or L-shaped anchor bolts shall be used to support piping from new cast-in-place concrete. Expansion anchors shall be used to fasten supports to existing concrete and masonry.
6. Anchorage shall be provided to resist thrust due to temperature changes, changes in diameter or direction, or dead-ending. Anchors shall be located as required to force expansion and contraction movement to occur at expansion joints, loops, or elbows, and as required to prevent

excessive bending stresses and opening of mechanical couplings. Anchorage for temperature changes shall be centered between elbows and mechanical joints used as expansion joints.

2.08 PRESSURE RELIEF VALVES (2-INCH AND LARGER)

A. Approved Manufacturers

1. CLA-VAL, Co. Model 50-01
2. Approved Equivalent

B. Materials

1. Size: As indicated on the drawings.
2. Body: Flanged Globe Style, Ductile Iron
3. Minimum Pressure Rating: 300 psi
4. Interior: Epoxy Coated
5. Disc Retainer & Diaphragm Washer: Bronze
6. Disc Guide, Seat & Cover Bearing: Stainless Steel
7. Disc: Buna N
8. Diaphragm: Buna N
9. Stem: Stainless Steel
10. Nut & Spring: Stainless Steel
11. Coating: Fusion Bonded Epoxy
12. Adjustment Range: 100 to 300 psi

2.09 AIR RELEASE VALVES

A. Approved Manufacturers

1. Model 50, 200A, or 200 as manufactured by APCO.
2. Model 115A manufactured by Val-Matic.
3. Approved Equivalent

B. Materials

1. Pressure Rating: 300 psi
2. Body and Cover: Ductile Iron
3. Float: Stainless Steel
4. Seat: Buna N
5. Inlet/outlet: 1“ NPT
6. Air release valves shall be sized for a water flow rate of 500 gpm and a pressure differential across the air release valve of 10 psi on the suction side of the pumps.
7. Air release valves shall be sized for a water flow rate of 500 gpm and a pressure differential across the air release valve of 200 psi on the discharge side of the pumps.

8. All air release valves shall discharge into a 1 ½-inch Schedule 80 pvc pipe that is routed from the air release valve to the sump pit. The air release valve drain pipe shall be sloped downward at a continuous slope to provide drainage to the sump pit.

2.10 HIGH PERFORMANCE BUTTERFLY VALVES

A. Approved Manufacturer and Type

1. DeZURIK.
2. Approved Equivalent.

B. Design

1. High performance butterfly valves and actuators shall be Model BHP Metal Seated as manufactured by DeZurik, or equal.
2. Valve disc shall be 316 stainless steel ASTM A351 Grade CF8M or other materials as specified.
3. Valve seats shall be 316 stainless steel. Seat design shall be pressure assisted and mechanical seal-to-disc sealing features capable of ANSI/FCI 70-2 IV and V unidirectional shutoff. ASME Class 150 valves shall provide drip-tight shutoff to 285 psi and ASME Class 300 valves to 740 psi.
4. Disc-to-Shaft Connection shall be subject to compression forces only through the use of a tangential pin or torque plugs. Designs using shear or through-pin connections are not allowed. All valves shall have blow-out proof shaft connections.
5. Valve Shaft shall be a one-piece design and shall be centerless ground to minimize bearing and packing wear. Shaft material shall be 2205 Duplex stainless steel ASTM A479 or other material as specified.
6. Valve Bodies shall be constructed of Carbon Steel ASTM 216 Grade WCB. The valve body shall be cast lugged or a wafer configuration with a minimum of four guide holes.
7. Adjustable Packing shall be multiple v-ring PTFE or braided carbon graphite including anti-extrusion ring. Valves shall permit inspection, adjustment, or complete replacement of packing without disturbing any part of the valve or actuator assembly except for the packing follower.
8. Testing: Each valve and valve actuator shall be assembled, adjusted, and tested as a unit by the valve manufacturer. Valve shall meet the shell/seat test leak rate requirements of API 598.
9. Certified Test Report shall include material certifications for pressure retaining components, low and high pressure seat leakage test per ANSI/FCI 70-2. Test reports shall be kept on file by the manufacturer, for a period of three (3) years from the date of manufacture.
10. A two year warranty shall be provided for all valves and actuators.

11. All valves located on the suction side of the pumps shall have a minimum pressure rating of 150 psi.
12. All valves located on the discharge side of the pumps shall have a minimum pressure rating of 300 psi.

2.11 WAFER CHECK VALVES

A. Wafer Check Valves, silent-type design:

1. Approved Manufacturer and Type:
   a. Model CSC, Series 300A Wafer Silent Check Valve manufactured by APCO.
   b. Approved Equivalent.

B. Design:

1. Body: Style 300A Wafer Silent Check Valve
2. Seat: Bronze, ASTM B584 C83600.
3. Spring: Type 316 Stainless Steel
4. Bushing: 316 Stainless Steel
5. Guides: Two (2) at opposite ends of disk shaft.
6. Flow area through body: Equal to or greater than area of equivalent size pipe.
7. Minimum pressure rating: 300 psi

2.12 BALL VALVES

A. Approved Manufacturer

1. Watts Regulator Company
2. Ford Meter
3. Mueller
4. Approved Equal.

B. Design

1. Manual ball valves up to 2-inch size:
   a. Body: Bronze.
   b. Ball and Stem: Stainless Steel.
   c. Seats: Glass-reinforced.
   d. Minimum working pressure rating of 200 psi for valves 10-inch and smaller.

2.13 PRESSURE GAUGES

A. Approved Manufacturer

1. Trerice No. 450
2. Approved Equivalent

B. Design

1. Lower stem mounted, 4-1/2” size, fiberglass reinforced polypropylene case.
2. Provide with dial having white background and black figures and graduations. Pointer shall be micro adjustable.
3. Each pressure gauge shall be installed with a brass tee handle cock.
4. Gauge shall be glycerin filled.
5. Taps and Bends: As shown on the Drawings.
6. Accuracy shall be ASME B40.100 Grade 2A.
7. Stopcocks: Trerice Series 865L gauge cock. Provide required brass nipples and associated piping accessories for a complete and functional installation.
8. Pressure Gauge Range: 0 – 200 PSI.
9. Install pressure gauges at locations shown on the Drawings.

2.14 FLOWMETERS

A. Approved Manufacturer and Model

1. Rosemount 8750W
2. Approved Equivalent

B. Connections

1. Provide meters suitable to connect to adjoining piping as specified for pipe fittings.
2. Electrical connections shall be made by Vault Manufacturer.

C. General

1. Low frequency electromagnetic induction type.
2. Produces a pulsed DC signal directly proportional to and linear with the liquid flow rate.
3. Designed for operation on 120 Vac +10%, 60 Hz +5%.
4. Metering tube:
   a. Constructed of steel.
   b. Flanges shall be compatible to mount to adjoining pipe.
   c. Shall be rated for a minimum working pressure of 300 psi.
5. Laying length shall be 1 1/2 times the nominal meter size.
6. Interior: Polyurethane liner.
7. Provide with capacitive-type electrodes that do not come into direct contact with fluid.
8. Meter housing: NEMA 4, epoxy coated.
9. Grounding Rings and accessories.
10. Accuracy:

a. Magnetic flow meters installed shall achieve a standards system accuracy of 0.25% of rate ±1.0 mm/sec from 0.04 to 6 ft/sec: above 6 ft/sec. Flow meters shall achieve a standard system accuracy 0.25% of rate ±1.5 mm/sec. Upstream and downstream straight run pipe diameters shall be at least 5 and 2 diameters, respectively.

D. Signal converter portions of the magnetic flow meters:

1. Provide remote wall-mounted type for all meters installed 5-feet and higher.
2. All meters installed lower than 5-feet shall have signal converters mounted directly to meter with the exception of the flow meters that measure filter effluent flow from each of the eight (8) filters. The filter flow meter signal converters shall be mounted on the aluminum equipment panels as shown on the Drawings.
3. Include both a magnet driver to power the magnet coils and the signal converter electronics.
    a. Signal converter to be remotely mounted, housed in a NEMA 4 cast aluminum case with the interconnecting cable supplied with meter.

E. The electronics shall be the solid state, feed back type, utilize integrated circuitry and be microprocessor controlled. All operational parameters shall be user configurable locally via an integral keypad or via a remote intelligent terminal. All changes to the database shall be by entry of numerical values, i.e., the range setting or selectable from a menu, i.e., the range units. When in the configuration mode, normal meter output shall be maintained.

F. The converters shall be provided with a back lighted, dot matrix type, liquid crystal display for easy reading of flow and configuration data. The display shall have two rows of 16 alphanumeric characters. For operation, the top row shall indicate instantaneous flow rate in percent or direct engineering units, field selectable. The second row shall display accumulated total flow. For configuration adjustment and system monitoring all database parameters and error messages shall appear in the display in plain English language. Error messages shall announce incorrect entry values which will be rejected by the computer.

G. Converter failure shall be announced in the display as an error message. In addition, an alarm contact shall provide for an external indication of failure. The range setting of the signal converters shall be continuously adjustable between 5% and 100% of meter capacity. The range and other parameter adjustments shall be direct reading via the integral digital display. The converters shall have input impedance of 10^{12} ohms or greater and not be affected by quadrature noise. It shall require no zero adjustment or special tools for startup. Input and output signals shall be fully isolated. The converter output shall be 4 to 20 mAdc

into 0 to 900 ohms. The converters shall incorporate an integral zero return circuit to provide a constant zero output signal in response to an external dry contact closure. The converters shall incorporate empty pipe detection as standard.

H. Supply 24 Vdc scaled pulse outputs for remote totalization. Pulse width between 0.032 and 2000 ms and weighting factors between 0.01 and 100 shall be software adjustable to match the requirements of the remote counter and to satisfy the process requirements, respectively.

I. Signal converter software shall include a noise reduction algorithm to minimize the effects of noise generating processes.

J. The signal converters shall have a thirteen function self-test feature for checking operation modes and alarms. Continuous diagnostics shall also be performed including, but not limited to, the monitoring of electrode reference voltage to sense meter coil failure. Sensing of metering failure shall activate a user configurable zero or 130% output signal and failure alarm contact closure. The signal shall drive a final control element to a position appropriate to satisfy the needs of the process under a failed meter condition.

K. The meters shall be hydraulically calibrated at a facility located in the United States and the calibration shall be traceable to the National Bureau of Standards. Computer printouts of the actual calibration data giving indicated versus actual flows at a minimum of three (3) flow rates shall be provided with the meters. The accuracy of the metering system shall be 1/2% of rate from 2 to 100% of flow for flow velocities of 0.6 to 31 feet per second.

L. Complete zero stability shall be an inherent characteristic of the meter systems. This shall eliminate the need to zero adjust the system with a full pipe at zero flow.

M. Meters shall include 1/4 inch 304 stainless steel grounding rings for grounding at each flange.

N. Metering tube and housing shall be factory primed and finish coated with manufacturer's standard coating system.

O. Meters are to be installed in accordance with manufacturer's recommendations. Position registers to read from left to right when installed in the vertical position. Meter locations as shown on the Drawings or as directed by the Engineer.

2.15 MULTISTAGE VERTICAL CENTRIFUGAL PUMPS

A. Required Pumps

1. Large Pumps:
   a. Pumps RUP1 and RUP2 (two total)

b. Each pump shall be capable of providing 500 GPM at 405 feet of total dynamic head.

2. Small Pump:
   a. Pump RUP3 (one total)
   b. Pump shall be capable of providing 50 GPM at 405 feet of total dynamic head.
3. Approved Manufacturer
   a. Grundfos
   b. Xylem
   c. Approved Equivalent
4. Design
   a. Pump configuration shall be vertical, inline, multistage, with the suction and discharge flanges on the same horizontal plane.
   b. The pump body shall be cast iron.
   c. The impellers shall be stainless steel, enclosed type, stacked vertically per manufacturer design.
   d. The pump shaft shall be constructed of high-grade stainless steel of sufficient size to carry maximum loads imposed.

B. Motors

1. Requirements noted herein are supplemental to section 16150 - Motors.
2. Pump motors, shall be NEMA frame, vertical mounted, close-coupled induction motors suitable for vertical, inline, multistage pumps.
3. Motors shall be dual wound, 3-phase, 60 Hz.
4. Pump Minimum Sizes:
   a. Pumps RUP1 and RUP2: The minimum pump motor size shall be 75 horsepower. Motor shall be premium efficiency TEFC.
   b. Pump RUP3: The minimum pump motor size shall be for 10 horsepower. Motor shall be premium efficiency TEFC.
5. The motors shall conform to NEMA Design B with normal starting torque, class F insulation and rated for continuous duty with a low starting current as well as a minimum 1.15 service factor.
6. Each motor shall include a mounted, easily accessible conduit box: gasketed with threaded conduit holes and including a ground lug.
7. Provide thermal overload protection with auto-reset; terminate all leads in easily accessible conduit box on motor enclosure; controls specified in Section 16.
8. Motor rotation shall match the pump rotation.
9. Motor shall be inverter duty rated for use with VFD’s.
10. At no point shall the motors be loaded beyond their name plate horsepower rating at any head in the pump’s operating range.

2.16 ELECTRICAL AND CONTROL SYSTEM

A. System Overview

1. Provide wall brackets for panel mounted load center.

2. Provide electrical raceways as shown on E series sheets as well as all other requirements as called out on drawings.
3. Ensure compliance with Division 26 – Electrical.

2.17 ELECTRICAL SYSTEM – GENERAL REQUIREMENTS

A. The North Dakota State Electrical Board required application for inspection with wiring diagrams on all out-of-state structures and skids containing any existing wiring completed prior to entering North Dakota Jurisdiction. Prefabricated Vault Manufacturer to comply with standards noted. Visit NDSEB.com/forms for more information.

B. All electrical equipment shall be circuited by prefabricated vault manufacturer.

C. Working Clearance:

1. Clear Space shall be provided in front of all electrical equipment to adequately meet the requirement of Article 110-26 of the National Electrical Code in regard to working space.

D. Pre-installed Conduit / Wiring Requirements Between Below-Grade and Above-Grade Equipment:

1. The Division 33 Station Manufacturer shall install GRS conduits and/or wiring between below-grade and above-grade mounted equipment before such equipment leaves the factory. Conducts and/or wiring shall be as indicated on the Electrical Drawings.
2. Reference the Electrical “E-Series” Sheets for additional information.
3. No conduit shall enter the sides of the below grade structure to prevent breaking of entry points for water and debris to enter the vault.
4. Sch. 40 PVC conduit or EMT conduit is not acceptable for use. Any installations found of these types of conduit will result in rework at Manufacturer’s expense.

PART 3 EXECUTION

3.01 FACTORY INSPECTION AND TESTING

A. Prior to assembly, all station components shall be inspected for quality and tested for proper function and freedom from defects.

B. Upon completion, the station shall be connected to a test tank and an operational test performed under simulated field conditions while a final inspection is conducted.

C. Any deficiencies or irregularities shall be corrected at the factory.

D. Automatic controls shall be adjusted to approximate job requirements.

3.02 PROJECT MANAGEMENT

A. Provide engineering and administrative services necessary to fulfill the requirements of this Specification.

B. Provide the services of an experienced project manager as the overall coordinator during the course of the project.

3.03 FIELD QUALITY CONTROL

A. Provide services of an experienced, competent, and authorized representative of manufacturer to visit site of Work and inspect, check, adjust if necessary, and approve equipment installation. Provide an 8-hour day for installation and startup for each prefabricated station.

B. Manufacturer’s representative shall be present when equipment is placed in operation.

C. Manufacturer’s representative shall revisit the job site as often as necessary until all problems are corrected and equipment installation and operation are satisfactory in the opinion of Engineer.

D. Devices requiring field calibration shall be calibrated in the presence of the Engineer's representative and documented.

E. Equipment supplier shall furnish to Owner, through Engineer, a written report prepared by station supplier certifying that equipment:

1. Has been properly installed.
2. Has been operated under full load conditions and that it operates satisfactorily.

3.04 PREFABRICATED VAULT INSTALLATION

A. Locate meter vault as directed by Engineer.

B. Final concrete base slab dimensions shall be determined by the Vault manufacturer/supplier.

C. Buoyancy prevention measures and vault anchoring shall be performed by the prefabricated vault manufacturer as a part of their design and submittals and include the following:

1. Concrete base slab: 12” thick, reinforced with a single mat of #4 bars spaced at 12” O.C.
2. Base slab concrete shall achieve a minimum compressive strength of 4,000 psi at 28 days.
3. The base slab dimensions shall be such that the edge of slab extends a minimum of one (1) foot beyond the exterior of the vault in all directions.

4. The vault shall be anchored to the concrete base slab with a minimum of six (6) connections. All four (4) corners shall be anchored. Each connection shall be made as detailed on the Drawings and utilize the following materials:
    a. Two (2) 3/4” stainless steel J-bolts with double stainless-steel nuts.
    b. 1/2” thick x 4” wide steel hold plate 4” wider than the channel or box beam.
    c. Anchor system designed by Vault Supplier and approved by Engineer.

D. Encase metal piping, transition couplings, fittings, and insulation below grade with polyethylene sheeting. Inlet and discharge piping shall be encased in a minimum of 2 inches of pipe insulation to 7.5 feet below grade. Provide insulation with a minimum R Value = 19.

E. Excavate and backfill trenches in accordance with the Specifications.

F. Anode packs for cathodic protection shall be placed prior to backfilling. Space anodes evenly around limits of excavation.

3.05 PROCESS PIPE PREPARATION

A. Make necessary field measurements to determine pipe laying lengths; store pipe with ends capped to prevent contamination and damage to interior; install pipe without forcing or springing. Do not store or ship small diameter pipe inside larger diameter pipe.

B. Ream pipe and tube ends. Remove burrs. Repair lining at pipe cuts.

C. Remove scale and dirt, inside and outside, before assembly.

D. Remove welding slag or foreign material from pipe and fitting materials.

E. Remove temporary preservative coatings from valves, fittings, and appurtenances prior to installation.

F. Clean, repair, or replace equipment malfunctioning due to presence of foreign material left in piping during installation or entering piping after installation due to Contractor's work.

3.06 THREADED JOINTS

A. Pipe threads shall conform to ANSI/ASME B1.20.1, NPT, and shall be fully and cleanly cut with sharp dies. Not more than three threads at each pipe connection shall remain exposed after installation. Ends of pipe shall be reamed after threading and before assembly to remove all burrs.

B. Threaded joints in plastic piping shall be made with Teflon thread tape applied to all male threads. At the option of the Contractor, threaded joints in other piping may be made up with Teflon thread tape, thread sealer, or a suitable joint compound. Thread tape and joint compound or sealers shall not be used in threaded joints that are to be seal welded. Exposed threads and joint between pipe and flange shall be caulked prior to painting.

3.07 COMPRESSION JOINTS

A. Tubing shall be cut square and all burrs shall be removed. Tubing shall be fully inserted into the compression fitting and the nut shall be tightened not less than 1-1/4 turns and not more than 1-1/2 turns past finger-tight, or as recommended by the fitting manufacturer.

3.08 SOLVENT WELDED JOINTS

A. All joint preparation, cutting, and jointing procedures shall comply with the pipe manufacturer’s recommendations and ASTM D2855. Pipe ends shall be beveled or chamfered to the dimensions recommended by the manufacturer. Newly assembled joints shall be suitably blocked or restrained to prevent movement time recommended by the manufacturer. Pressure testing of solvent welded piping systems shall not be performed until the applicable curing time, as set forth in Table X2.1 of ASTM D2855, has elapsed.

3.09 PROCESS PIPE HYDROSTATIC TESTING

A. Hydrostatically test interior vault piping in accordance with AWWA C600 prior to shipment to Project site.

3.10 PROCESS PIPE SUPPORTS, ANCHORS, AND SLEEVES FINISHES

A. Prime coat non-galvanized steel hangers and supports.

3.11 PROCESS VALVE INSTALLATION

A. Install valves in the locations and configurations shown on Drawings or as directed by the Engineer.

B. Provide adequate structural support of installed valves as required.

C. Install valves per manufacturer’s recommendations.

3.12 PROCESS VALVE FINISHES

A. All process valves shall be factory finished.

3.13 FLOWMETER INSTALLATION

A. Meters to be installed in accordance with manufacturer's recommendations.

B. Position registers to read from left to right when installed in vertical position.

3.14 PROCESS GAUGE INSTALLATION

A. Install gauges with shut off cocks in straight runs of piping so that they may be read from floor or operating platform.

B. Provide extension necks on pressure taps in insulated piping, vessels, and equipment.

C. Install gauges upstream and downstream of all control valves and at all locations indicated on the Drawings.

3.15 PAINTING

A. Provide manufacturer's standard coating.

3.16 LABELING

A. Label all field mounted control devices, instrumentation, switches, etc., with tag number and item description, labeling shall conform to all sections within contract documents.

B. Labels shall be engraved laminated plastic with ¼" high lettering. Labels shall be attached with stainless steel screws to the device or nearby wall.

3.17 PROGRAMMING SERVICES

A. Refer to Division 16 specifications.

END OF SECTION

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DIVISION 16
ELECTRICAL

Division 16 - Electrical

SECTION 16000 - ELECTRICAL GENERAL CONDITIONS

PART 1 GENERAL

1.1. SUMMARY

A. The Electrical General Requirements outlined in this specification shall apply to Division 16 Electrical Specifications.

B. The Contractor shall provide supervision, labor, material, equipment, machinery and any other items necessary to complete the electrical systems. Items of equipment are specified in the singular; however, the Contractor shall provide and install the number of items of equipment as indicated in the drawings, and as required for complete systems.

1.2. WORK UNDER THIS DIVISION

A. It shall be noted that this Section of the Specifications includes:

1. A - GENERAL
2. B - ELECTRICAL REQUIREMENTS

1.3. CODES, RULES, PERMITS, FEES

A. The Contractor shall give all necessary notices, obtain all permits and pay all government and state sales taxes, fees, and other costs, including utility connections or extensions, in connection with his work; file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction; obtain all required certificates of inspection for his work and deliver same to the Engineer before request for acceptance and final payment of the work.

B. All materials furnished and all work installed shall comply with the current state adopted Edition of the National Electrical Code, with the requirements of local utility companies, and with the requirements of all governmental departments having jurisdiction.

C. All material and equipment for the electrical portion of the system shall bear the approval label, or shall be listed by Underwriter's Laboratories, Incorporated or another Nationally Recognized Testing Laboratory (NRTL) approved by OSHA.

D. All prefabricated structures built outside of North Dakota shall be delivered with state required inspections as required by North Dakota State Electrical Board.

1.4. INTENT

A. It is the intention of these specifications and drawings to call for finished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean "furnish and install complete and ready for use."

1.5. SURVEYS AND MEASUREMENTS

A. The Contractor shall base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at site and check correctness of same as related to the work.

B. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, he shall notify the Engineer, through the General Contractor, and shall not proceed with his work until he has received instructions from the Engineer.

1.6. DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the contract. The engineering drawings and details shall be examined for exact locations of fixtures and equipment. Where they are not definitely located, this information shall be obtained from the Engineer.

B. The Contractor shall follow drawings in laying out work, and check drawings of other trades to verify spaces in which work will be installed.

1.7. "OR EQUAL"

A. Wherever the words “or equal" or “equal to” or “equivalent” are used in connection with any specified material, it is to be understood that such words mean any material or work of any kind claimed to be an equal in quality to the work or material specified, but does not require prior written approval by the Engineer.

B. Wherever the words "approved equal" are used in connection with any specified material, it is to be understood that such words mean any material or work of any kind claimed to be an equal in quality to the work or material specified and shall be so approved in writing by the Engineer.

C. It is further understood that no material or work shall be presented to the Engineer as work or material equal to that specified with the full understanding on the part of the manufacturers and agents for the so called "equal" material, and the full understanding on the part of the Contractor, that the Engineer is to use his own judgment in the matter, that his decision is final, and that in the event of an adverse condition, no claim of any sort shall be made against the Owner or Engineer.

1.8. SHOP DRAWINGS

A. The Contractor shall submit for approval, detailed shop drawings of all equipment and all material required to complete the project, and no material or equipment may be delivered to the job site or installed until the

Contractor has in his possession the approved shop drawings for the particular material or equipment. The shop drawings shall be completed as described by Specification Section 01300 – Submittals.

1.9. EQUIPMENT DEVIATIONS

A. Where the Contractor proposes to use an item of equipment other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundations, piping, wiring, or any other part of the mechanical, electrical, or structural layout, all such redesign and all new drawings and detailing required therefore shall be prepared by the Contractor at his own expense and approved by the Engineer.

B. Where such approved deviation requires a different quantity and arrangement of wiring, conduit, and equipment from that specified or indicated on the drawings, the Contractor shall furnish and install any such controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system at no additional cost to the Owner.

1.10. COOPERATION WITH OTHER TRADES

A. This Contractor shall give full cooperation to other trades and shall furnish in writing to the Contractor, with copies to the Engineer, any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

B. Where the work of the Contractor will be installed in close proximity to, or will interfere with work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. If the Contractor installs his work before coordinating with other trades or so as to cause any interference with work of other trades, he shall make the necessary changes in his work to correct the condition without extra charge.

C. The Contractor shall furnish to other trades, as required, all necessary shop details for the proper installation of work and for the purpose of coordinating adjacent work.

D. Refer to other Divisions of the Specifications for equipment furnished by others and work required thereof by the Contractor.

1.11. PROTECTION

A. The Contractor shall protect all work and material from damage by his work or workmen, and shall be liable for all damage thus caused.

B. The Contractor shall be responsible for work and equipment until finally inspected, tested, and accepted; he shall protect work against theft, injury or damage; and shall carefully store material and equipment received on site, which is not immediately installed. He shall close open ends of work

with temporary covers or plugs during storage and construction to prevent entry of obstructing material.

1.12. SCAFFOLDING, RIGGING, HOISTING

A. The Contractor shall furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any electrical equipment and electrical apparatus furnished. Remove same from premises when no longer required.

1.13. MATERIAL AND WORKMANSHIP

A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new of first class quality, and shall be furnished, delivered, erected, connected, and finished in every detail, and shall be so selected and arranged as to fit properly into the available spaces. Where no specific kind or quality of material is given, a first class standard article as approved by the Engineer shall be furnished.

B. The Contractor shall furnish the services of an experienced superintendent who shall be constantly in charge of the installation or work, together with all skilled workmen, helpers, and labor required to unload, transfer, erect, connect up, adjust, start, operate, and test each system. The job superintendent shall be a Master Electrician licensed in the State that the work is being performed.

C. Unless otherwise specifically indicated on the plans or specifications, all equipment and materials shall be installed with the approval of the Engineer in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

1.14. STANDARDS AND CODES

A. Provide all material, equipment, and work in accordance with applicable rules, codes, ordinances and regulations of local, state, federal governments, local utility companies, and other authorities having lawful jurisdiction. Conform to the latest editions and supplements of codes, standards, and recommended practices in addition to the following:

1. Safety Codes:
   a. National Electrical Safety Code Handbook
   b. Occupational Safety and Health Standard (OSHA)
2. National Fire Codes:
   a. NFPA 70 - National Electric Code (NEC)
3. Underwriters Laboratories, inc.:
   a. UL 508A Standard - Industrial Control Panels
   b. All applicable UL standards as referenced in other sections.

c. All material and equipment for the electrical portion of the system shall bear the approval label, or shall be listed by Underwriter's Laboratories, Limited Liability company or another Nationally Recognized Testing Laboratory (NRTL) approved by OSHA and the local electrical inspector.

4. Third Party Certifications:
   a. All equipment not bearing a UL listing shall be provided with a third-party certification stamped by a registered Professional Engineer licensed in the state of which the work is being performed.
5. State Electrical Board:
   a. Laws, Rules, Wiring Standards, and applicable local state standards.

B. Drawings and specifications indicate minimum construction standards. Should any work indicated be substandard to any ordinances, lower codes, rules or regulations bearing on work, the Contractor shall promptly notify the Engineer in writing, through the General Contractor, of any necessary changes to be adjusted. However, if Contractor provides any work knowing it to be contrary to any ordinances, laws, rules and regulations, they shall thereby have assumed full responsibility and bear all costs involved for correction and compliance. In any instance where the specifications call for materials for construction of a better quality or larger size than required by codes, provisions of these specifications shall take precedence. Codes shall govern in case of direct conflict between codes, plans and specifications.

1.15. TESTS AND OPERATION RECORDS

A. General: Test all equipment installed under this specification and demonstrate its proper operation to the Engineer. No equipment shall be tested or operated for any other purpose, such as checking motor rotation, until it has been fully lubricated in accordance with manufacturer's instructions and, if it is a centrifugal pump, until it has been connected to piping systems and supplied with sufficient water so that it will not run dry.

1. Any defects in workmanship, material, equipment or any grounds or short circuits shall be corrected by the Contractor before final acceptance.
2. Submit at least eight (8) copies of data noted below to Engineer prior to final inspection.
3. Maintain a marked set of drawings to record all deviations made from routes, locations, circuiting, etc. shown on contract drawings. Prior to final inspection submit one new set of project drawings with deviations and changes clearly indicated.

B. Testing: The entire electrical system shall be tested by Contractor in presence of the Engineer. Every local switch, panelboard, service

breaker, safety switch, and circuit breaker shall be operated under load conditions. Every fixture and equipment tested and operated. Test shall include any tests specified in any part of this section.

1. Contractor shall measure resistance of electrical system with a "Megger" from busses of main switch to ground with main breaker open, and bonding jumper between neutral and ground temporarily removed. Values are to be determined with all panelboards, motor controls and switch circuits open. If any value measured is less than 100,000 ohms, each feeder shall be measured and must exceed those set forth in Article 110 of National Electrical Code, before they shall be accepted. Typewritten test results shall be furnished to the Engineer.

C. Recording and Distribution

1. Record nameplate horsepower, amperes, volts, phase, efficiency, service factor and other necessary data on motors, and other electrical equipment furnished and/or connected under this contract.
2. Record motor starter catalog number, size and rating and/or catalog number of thermal overload units installed in all motor starters furnished and/or connected under this contract. See motor starter specifications for instructions for proper sizing of thermal overload units.
3. Record ampere per phase at normal or near normal loading of each item of equipment furnished and/or connected.
4. Record voltage and ampere per phase readings taken at service entrance equipment after completion of project with operation at normal electrical load.
5. Record all VFD settings, solid-state motor controller settings, electronic overload relay settings, relay settings, device settings, and related electronic equipment setting.
6. Record all instrumentation and device calibration settings.
7. Distribute copies of all recorded information to the Engineer along the project O&M manuals.

1.16. DEMONSTRATION OF COMPLETED ELECTRICAL SYSTEMS

A. General: Upon completion of entire electrical systems, Contractor shall demonstrate to Engineer's satisfaction that all installed electrical systems are in perfect operating condition, that they perform all power and control functions intended and that they are installed in strict accordance with project drawings and specifications.

B. Materials: Contractor shall provide all necessary testing equipment, tools, materials, dummy loads, etc., required to properly demonstrate performance.

1.17. OPERATING AND MAINTENANCE INSTRUCTIONS

A. Provide O/M manuals per Specification Section 01730 – Operation and Maintenance Data.

PART 2 ELECTRICAL REQUIREMENTS

2.1. BASIC MATERIALS

A. General: Material and equipment installed under this contract shall be new, unused, and without damage. Physical size of equivalent or substitute equipment shall not be larger than space provided including space required for access and maintenance of equipment.

END OF SECTION

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Division 16 - Electrical

SECTION 16150 - MOTORS

PART 1 GENERAL

1.1. SECTION INCLUDES

A. Process equipment, ventilation and general purpose motors.

1.2. REFERENCES

A. Anti-Friction Bearing Manufacturers Association (AFBMA)

B. Institute of Electrical and Electronic Engineers (IEEE)

1. IEEE 112 Standard Test Procedure for Polyphase Induction Motors and Generators.

C. National Fire Protection Association (NFPA):

1. NFPA 70, National Electrical Code (NEC), Current Adopted Edition.

D. National Electrical Manufacturer's Association (NEMA).

1. NEMA MG00001 - Motors and Generators.
2. NEMA 10250 - Enclosures for Electrical Equipment.

1.3. SUBMITTALS

A. Shop drawings and product literature in conformance with Section 01300 and including:

1. Dimension drawings
2. Wiring diagrams
3. Equipment mechanical and electrical specification sheets
4. Efficiency information

B. Submit operation and maintenance data in accordance with Section 01730, unless such data is included in the data provided for individual equipment items.

1.4. DELIVERY, STORAGE AND HANDLING

A. Motors shall be covered and stored in a dry, warm (50°F) location prior to installation.

B. Once installed, the space shall be heated and kept dry. The motor shall be covered until ready for service. Covering shall not trap moisture in the motor.

PART 2 PRODUCTS

2.1. MOTORS

A. Motors shall conform with applicable NEMA, IEEE, and ANSI standards. Motors using non standard frames or otherwise of special characteristics will be permitted only by special permission of the Engineer, the intent being to confine such usage to cases of absolute necessity.

B. Motor ratings shall be based on current NEMA design standards for continuous duty and/or multiple starts per hour on motors through 100 horsepower. On motors larger than 100 horsepower starting shall be based on NEMA MG1-20.43 number of starts. Horsepower, torque, and speed characteristics shall be suitable for the full normal range of operating conditions of the driven equipment without exceeding 95% of the nameplate FLI and the temperature rise ratings regardless of size. Nameplate FLI shall be based on nameplate HP and shall not include the 15% S.F. In addition, all motors 1 horsepower and larger shall have a 1.15 service factor. Wherever horsepower ratings of motors proposed differ from those shown or specified, this fact shall be prominently noted on the shop drawings submitted, or otherwise brought to the attention of the Engineer.

C. Process and major equipment drive motors shall be 3 phase, squirrelcage induction type NEMA Design B, dual voltage in all sizes and types where this rating is standard. Larger motors and special motors where dual voltage construction is not available shall be furnished in ratings consistent with the nominal system voltage. Where process drives of fractional horsepower are required, standard frame 56 units shall be supplied. Such drives requiring limited power input shall employ overload heaters undersized accordingly.

D. General purpose single phase motors, 1/3 HP and smaller, shall be 115 volt capacitor start type designed for continuous duty. Light duty motors of the domestic appliance variety will not be acceptable in this work. Bearings on frame 56 fractional horsepower motors shall be of the antifriction or sleeve type.

E. The division furnishing motors, or equipment containing or including motors, shall be responsible for delivery, handling and setting regardless of local agreements as to actual work jurisdiction. Further, this responsibility shall include checking of lubrication, drive alignment and condition, indication of proper rotation, and any or all other matters relating to operative readiness. When all checks are satisfactorily accomplished, the readiness of the unit for operation shall be indicated by a conspicuous and legible tag installed by the responsible individual.

F. As part of the operational test the responsible Division shall arrange for checking and recording of load current and verification of rating of overload heaters. No unattended operation of the equipment shall be permitted until completion of this procedure.

G. Motor frames shall be totally enclosed fan cooled unless otherwise specified.

H. All motors larger than NEMA 56 frame shall have antifriction (ball or roller) bearings, sized for a B10 life of at least 30,000 hours under normal loading conditions. Bearing shall be AFBMA standard sizes. Motors shall be equipped with end shield mounted ball bearings made to AFBMA standards, and be of ample capacity for the motor rating. The bearing housing shall be large enough to hold sufficient lubricant to minimize the need for frequent relubrication, but facilities shall be provided for adding new grease and draining out old grease without major motor disassembly. The bearing housing shall have long, tight, running fits or rotating seals to protect against the entrance of foreign matter into the bearings, or leakage of grease out of the bearing cavity.

I. Balance and Vibration:

1. The vibration in any direction, as measured at the bearing housings, with the motors running at normal voltage and frequency, the shaft axis in normal position, and with one half of a standard key in the keyway shall conform with the following:

VIBRATION LIMITS

Maximum Permissible Total Amplitude
Peak to Peak (in.)

SYNCHRONOUS SPEED (RPM)

Frame Diameter Series	Below 1700	1700 - 3499	3500 & Above
180,210,220	0.002	0.0015	0.001
250,280,320	0.002	0.0015	0.001
360,400,440	0.002	0.0015	0.001

2. If balancing weights are added to the rotor, they shall be permanently secured by welding, peening, or other method approved by the Engineer.

J. Materials:

1. Stator Frames and Endshields as follows:
   a. Dripproof and Standard Duty – TEFC: Stator frames and end shields, may be cast aluminum, steel, or cast iron, whichever is manufacturer's standard.

b. Severe Duty - TEFC and Explosion Proof: Frames and end shields shall be cast iron for all frame sizes. Extruded aluminum frames will be considered with prior approval.

2. Other External Parts as Follows:
   a. Dripproof and Standard Duty - TEFC: Fan covers and conduit boxes may be cast iron, aluminum or steel, depending on manufacturer's standard.
   b. Severe Duty - TEFC and Explosion Proof: Fan covers and conduit boxes shall be cast iron.

K. Conduit Boxes:

1. For motors with parallel sets of cables or other field circumstances which require it, Contractor shall provide a new terminal box which meets the size requirements of the NEC.

L. Eyebolts:

1. All motors weighing more than 50 lbs. shall be drilled and tapped for a lifting eyebolt.

M. Motor Leads:

1. Motor leads into conduit box shall have same insulation class as the winding, and be equipped with a numbered brass or copper terminal staked or otherwise mechanically fastened to the lead sufficient to resist 15 lbs. pull. Leads shall be marked throughout the entire length to provide identification after terminals are taped or clipped.

N. Ventilating Fans:

1. Dripproof and TEFC: The fans forcing ventilating air through or over a motor may be steel, aluminum, or molded plastic, whichever is manufacturer's standard.
2. Severe Duty - TEFC and Explosion Proof: Ventilating fans shall be non-sparking, abrasion and chemical resistant, cast brass or polypropylene.

O. Shaft Seals:

1. All severe duty motors and TEFC motors, 254 frame and larger, shall have a rotating seal or slinger located on the shaft at the drive end endshield opening to prevent moisture or other foreign material from entering the bearing cavity.

P. Nameplates:

1. Aluminum nameplates may be used on dripproof and standard TEFC motors. Severe duty enclosed motors shall have nameplates of stainless steel. Nameplates shall be stamped to include the following information:
   a. Horsepower (not including 15% S.F.)
   b. Speed
   c. Time Rating

d. Frequency
e. Phases
f. Model Number
g. Rated Voltage
h. Service Factor (1.15 on all motors 1 HP and larger)
i. Full Load Amps (based on nameplate HP, not including 15% S.F.)
j. Insulation Class
k. NEMA Design
l. NEMA Code Letter
m. Maximum Ambient
n. Bearing Identification
o. Power Factor

Q. Connection Diagrams

1. The motor connection diagram shall be permanently attached to the motor either inside the conduit box or on the motor frame in a readable location from the conduit box side.

R. Locked Rotor Characteristics:

1. Unless shown otherwise, motors with a nameplate rating of 5 to 20 horsepower shall have a locked rotor characteristic not exceeding Code H. Motors with a nameplate rating of 25 through 50 horsepower shall not exceed NEMA Code G locked rotor characteristics. Motors larger than 50 horsepower shall not exceed NEMA Code F locked rotor characteristics.

S. Severe Duty:

1. Motors designated for severe duty shall have the following characteristics in addition to those designated in the specification:
   a. Stainless steel nameplate.
   b. Cast iron housing, bearing brackets, fan guard.
   c. Cast iron conduit box.
   d. Cast brass or polypropylene fan.
   e. Zinc plated hardware.
   f. Minimum of 2 extra epoxy varnish, or equal, dips and bakes on windings.
   g. Specifically designed for use with a solid-state inverter variable frequency drive (VFD).
   h. Minimum service factor of 1.00 when operating from a VFD.
   i. 1600V insulation system designed for inverter duty, Class F temperature rise minimum.
   j. Thermal switch embedded in the motor windings to stop the VFD on motor overtemperature condition. Normally closed contacts rated 5A at 120 VAC, nominal.

T. Heater:

1. Where specified in the process equipment section, motors shall contain internal heaters to operate on 120 VAC to minimize

condensation inside the motors. Unless otherwise required, the nominal heater size shall be 150 VA.

U. External Finish:

1. All motors shall be prime painted with corrosion resisting metal primer, and finish painted with a durable machinery gray enamel, manufacturer's standard unless otherwise specified.
2. All bolts, screws, and other external hardware shall be treated by zinc with iridite or zinc chromate for resistance to corrosion.

V. Testing:

1. Motor testing procedure shall be in accordance with the American Standard Test Code for polyphase induction motors and generators, IEEE 112A. All motors shall be given routine test to determine that they are free from electrical or mechanical defects. The routine test shall, as a minimum, conform to MG1-12.51.

W. Preparation for Shipment:

1. Before shipment, the shaft extension and any other bare exposed metal parts of each motor shall be coated with an easily removable rust preventative.
2. All motors shall be securely fastened to a hardwood skid or pallet for fork truck handling, and be covered for protection against dirt and moisture during transit and for short time outdoor storage.

X. Operating Characteristics:

1. Motors shall meet or exceed the starting locked rotor and maximum breakdown torques specified by NEMA for the NEMA design. The locked rotor starting currents shall not exceed NEMA maximum values for the specified NEMA design and rating. The current density and heating characteristics shall be such that the motors will not suffer damage if subjected to a maximum of ten (10) seconds stall at six times full load current. Except as noted, the services factor of the motor shall be in accordance with NEMA Standards. The insulation system of the motor shall be designed for 40,000 hours operation under usual service conditions as described under NEMA 1-14.02. The motor manufacturer shall use IEEE standards to establish the suitability of the insulation system to meet these requirements.

Y. Resistance Temperature Detectors (RTDs):

1. Furnish and install resistance temperature detectors (RTDs) on all motors 250 hp and larger, and on smaller motors where indicated. The RTD system for each motor shall consist of the following:
   a. Two (2), 100 ohm platinum bearing RTDs.
   b. Minimum of six (6), 100 ohm platinum stator winding RTDs.

Z. Energy Efficiency:

1. Efficiency shall be defined as the “NEMA Nominal Efficiency” at full load, as detailed in NEMA MG-1-12.58, and shall meet or exceed the values in the following tables. If a higher value is specified in the respective equipment section, then the higher value shall apply.

FULL LOAD EFFICIENCIES OF PREMIUM EFFICIENT MOTORS

OPEN MOTORS			HP	CLOSED MOTORS		
1200 RPM	1800 RPM	3600 RPM		1200 RPM	1800 RPM	3600 RPM
82.5	85.5	77.0	1.0	82.5	85.5	77.0
86.5	86.5	84.0	1.5	87.5	86.5	84.0
87.5	86.5	85.5	2.0	88.5	86.5	85.5
88.5	89.5	85.5	3.0	89.5	89.5	86.5
89.5	89.5	86.5	5.0	89.5	89.5	88.5
90.2	91.0	88.5	7.5	91.0	91.7	89.5
91.7	91.7	89.5	10.0	91.0	91.7	90.2
91.7	93.0	90.2	15.0	91.7	92.4	91.0
92.4	93.0	91.0	20.0	91.7	93.0	91.0
93.0	93.6	91.7	25.0	93.0	93.6	91.7
93.6	94.1	91.7	30.0	93.0	93.6	91.7
94.1	94.1	92.4	40.0	94.1	94.1	92.4
94.1	94.5	93.0	50.0	94.1	94.5	93.0
94.5	95.0	93.6	60.0	94.5	95.0	93.6
94.5	95.0	93.6	75.0	94.5	95.4	93.6
95.0	95.4	93.6	100.0	95.0	95.4	94.1
95.0	95.4	94.1	125.0	95.0	95.4	95.0
95.4	95.4	94.1	150.0	95.8	95.8	95.0
95.4	95.8	95.0	200.0	95.8	96.2	95.4
95.4	95.8	95.0	250.0	95.8	96.2	95.8
95.4	95.8	95.4	300.0	95.8	96.2	95.8
95.4	95.8	95.4	350.0	95.8	96.2	95.8
95.8	95.8	95.8	400.0	95.8	96.2	95.8
96.2	96.2	95.8	450.0	95.8	96.2	95.8
96.2	96.2	95.8	500.0	95.8	96.2	95.8

PART 3 EXECUTION

3.1. INSTALLATION

A. All wire terminations within the motor termination j-box for 480V class motors and below shall be performed by means of utilizing insulated connector blocks in lieu of wire nuts or split bolt connectors and mastic tape. The insulated connector blocks shall be manufactured by Polaris, Ilsco, or equal.

3.2. SUBMITTALS

A. Contractor shall fill out and submit attached “Motor Data Sheet” for each project motor as part of shop drawings submittals. Contractor shall copy

the attached Motor Data Sheet as required for submitting on all project motors. See Motor Data Sheet located at the end of this Section.

B. Contractor shall fill out and submit the attached “Pump/ Equipment Control Data Sheet” for each project motor driven equipment item as part of the shop drawing submittals. Contractor shall copy the attached Pump/ Equipment Control Data Sheet as required for submitted on all project motor driven equipment. See Pump/ Equipment Control Data Sheet located at the end of this Section.

3.3. START UP

A. Check lubrication, drive alignment and condition, indication of proper rotation, and other matters relating to operative readiness. When all checks are satisfactorily accomplished, the readiness of the unit for operation shall be indicated by a conspicuous and legible tag.

B. Arrange for checking and recording of load current and verification of rating of overload heaters. No unattended operation of equipment shall be permitted until completion of this procedure.

MOTOR DATA SHEET

JOB NO._____ CONTRACT NO._____ TAG NO._____ DESCRIPTION_____

NAMEPLATE DATA

MFG_____TYPE_____ FRAME_____ HP_____ DESIGN_____PHASE_____ VOLTS_____AMPS_____ INS. CLASS_____ DESIGN RISE (C)_____ NEMA CODE LETTER _____ POWER FACTOR_____ MAX AMBIENT (C)_____ ENCLOSURE TYPE_____S.F. ON A-T-L START_____S.F. ON VFD_____ WEIGHT (LBS)_____LUBRICATION TYPE_____ INVERTER DUTY (Y/N)_____INSULATED BEARING ON NON DRIVE END (Y/N)____ TYPE/ MATERIAL OF BEARINGS (DRIVE END)_____ TYPE/MATERIAL OF BEARINGS (NON DRIVE END)_____

PERFORMANCE DATA

NEMA NOMINAL EFFICIENCY AT FULL LOAD (%)_____ GUARANTEED EFFICIENCY AT FULL LOAD (%)_____¾ LOAD_____½ LOAD_____ POWER FACTOR AT FULL LOAD (%)_____¾ LOAD_____½ LOAD_____ NO LOAD AMPS_____ MAX KVAR _____

THERMAL DATA ROTOR INERTIA

(LB-FT SQ.)_____LOAD INERTIA (LB-FT SQ.)_____ LOCKED ROTOR AMPERES: AT MAXIMUM RATED TERMINAL VOLTAGE (100%)_____ AT SPECIFIED TERMINAL VOLTAGE (____%)_____ AT MINIMUM RATED TERMINAL VOLTAGE (____%)_____ ACCELERATION TIME (SECONDS) OF MOTOR PLUS LOAD: AT MAXIMUM RATED TERMINAL VOLTAGE (100%)_____ AT SPECIFIED TERMINAL VOLTAGE (____%)_____ AT MINIMUM RATED TERMINAL VOLTAGE (____%)_____ SAFE STALL TIME (SECONDS): AMBIENT_____ RUNNING_____ MAXIMUM STARTS PER HOUR_____

ACCESSORY DATA THERMAL SWITCHES

(Y/N)____TYPE/ MFR/ MODEL_____ TRIP TEMP (C)____ STATOR RTDS: TYPE_____OHMS_____QUANTITY___TRIP/ALARM TEMP (C)____ BEARING RTDS: TYPE_____OHMS_____QUANTITY___TRIP/ALARM TEMP (C)____

JOB NO._____ CONTRACT NO._____ TAG NO._____ DESCRIPTION_____ _

NAMEPLATE DATA AND STARTING METHOD PUMP OR EQUIPMENT

MFG_____TYPE/ MODEL_____ BRAKE HORSEPOWER REQUIREMENT OF DRIVEN LOAD BASED ON DESIGN CRITERIA (HP)_____ MOTOR MFG_____ TYPE/ MODEL_____ HP_____ RPM_____ DESIGN_____PHASE_____ VOLTS_____AMPS_____ MAXIMUM AMBIENT OPERATING TEMP (C)_____ TYPE OF MOTOR STARTING METHOD DESIGNED AROUND: A-T-L START, ELECTRONIC SOFT START, VFD START (CIRCLE ONE). SUITABLE FOR USE ON A-T-L STARTING METHOD (Y/N)_____ SUITABLE FOR USE ON ELECTRONIC SOFT STARTING METHOD (Y/N)_____ SUITABLE FOR USE ON VFD STARTING METHOD (Y/N)_____ MOTOR OVERLOAD PROTECTION CLASS REQUIRED (CLASS 10, CLASS 20, CLASS 30) – CIRCLE ONE

CONTROL REQUIREMENTS MINIMUM START UP VOLTAGE

(%) X RATED VOLTAGE_____ MINIMUM START UP CURRENT (%) X FULL LOAD AMPS_____ MAXIMUM RAMP UP TIME FROM STOPPED CONDITION TO MINIMUM SPEED (SEC)_____ MIN OPERATING SPEED (RPM)_____MAX OPERATING SPEED (RPM)_____ MIN OPERATING SPEED (HZ)_____MAX OPERATING SPEED (HZ)_____ MINIMUM FLOW (FPS)_____ MINIMUM FLOW (GPM)_____ IS A DUAL SLOPE RAMP ON START UP REQUIRED? (Y/N)_____ IF A SINGLE SLOPE OR DUAL SLOPE RAMP ON START UP IS BEING PROVIDED, WHAT IS THE MAXIMUM ALLOWABLE RAMP TIME FOR ATTAINING MINIMUM SPEED FROM A STOPPED CONDITION (SEC)_____ MAXIMUM RAMP DOWN TIME FROM MINIMUM RUNNING SPEED TO STOPPED (SEC)_____ IS THERE A REED CRITICAL FREQUENCY OR SKIP FREQUENCY THAT SHOULD BE AVOIDED? (Y/N)_____ IF THERE IS A FREQUENCY OR FREQUENCY BAND THAT SHOULD BE AVOIDED FOR MOTOR OPERATION, WHAT IS IT ?(HZ)_____ IF OPERATION IS FROM A VFD, WHAT METHOD OF VFD CONTROL IS SUGGESTED OR PREFERRED (VOLTS/HERTZ, SENSOR-LESS VECTOR, OTHER?) PLEASE FILL IN_____

END OF SECTION

Division 16 - Electrical

SECTION 16210 - CONDUIT

PART 1 GENERAL

1.1. SUMMARY

A. Conduit system for conductors. Low voltage control conductors and fiber optic cabling shall be installed within conduit.

B. Related Work:

1. Section 16220 - Power and Instrumentation Cable - Less than 600 Volts

1.2. REFERENCE STANDARDS:

A. U.L. 6 - Rigid metal conduit.

B. U.L. 360 - Liquid-tight flexible steel conduit.

C. U.L. 651 - Rigid non-metallic conduit.

D. NEMA Standard Publication TC-2 - Rigid PVC for underground installations.

E. NEMA Standard Publication RN 1-2005 – PVC coated rigid steel conduit.

1.3. DELIVERY, STORAGE AND HANDLING:

A. Store in a dry area, protected from the weather.

PART 2 PRODUCTS

2.1. RIGID METAL CONDUIT (STEEL)

A. Manufacturer: Equal to the Wheatland Steel Company

B. Type: Steel heavy wall, galvanized unless noted otherwise on Drawings.

C. Minimum trade size is 3/4-inch; other sizes as required by NEC based on quantity of conductors.

2.2. FLEXIBLE METAL CONDUIT (LIQUID-TIGHT)

A. Manufacturer: Equal to Alflex

B. Type: Steel

C. Weatherproof covering

2.3. METALLIC EXPANSION FITTINGS

A. Manufacturer: Equal to OZ Electrical Manufacturing Company.

B. Minimum trade size is 3/4-inch.

2.4. HANGERS AND SUPPORTS

A. Manufacturer: Equal to B-Line Products.

B. All conduit fasteners shall be stainless steel in pipe gallery.

2.5. SURFACE METAL WIREWAY

A. Manufacturer: Equal to Hoffman or Walker

B. Type: Lay-in with hinged cover and suitable fittings. Provide integral barrier where shown on the Drawings.

C. NEMA 12, Nema 4 or NEMA 4X construction as called for on Drawings.

2.6. NON METALLIC CONDUIT (HEAVY WALL)

A. Manufacturer: Equal to Carlon.

B. Minimum trade size is 3/4-inch.

C. Type: Schedule 80 polyvinyl chloride, except where Schedule 40 is specifically called for on Drawings.

2.7. NON METALLIC EXPANSION FITTINGS

A. Manufacturer: Equal to Carlon.

B. Type: Suitable for use with non metallic conduit.

C. Minimum trade size is 3/4-inch.

PART 3 EXECUTION

3.1. INSTALLATION

A. Size conduits as shown on the Drawings or as required by National Electrical Code (whichever is larger) for number and size of conductors installed. Minimum trade size for home runs is 3/4-inch; other sizes as required b NEC based on quantity of conductors.

B. Contractor shall not exceed 270 degrees of bend in any single conduit run without an additional pull point.

C. Raceways shall have equipment ground conductor installed. The raceway shall not be utilized as an EGC.

D. Support all conduits from structural system, independent of ductwork, ceiling system supports and main runners. Do not support conduit from conduit.

E. Cut conduit joints square and ream smooth. Make bends with an approved bender, or utilize standard conduit elbows.

F. All threaded joints shall have thread sealant applied per NEC prior to attaching couplings or accessories.

G. For buildings where walls are concrete or concrete blocks, Contractor shall core drill walls or coordinate reinforced, boxed out areas as required to install all conduit in a neat and workmanlike manner. Contractor shall also patch all wall penetrations and prepare surface for final paint by General Contractor. Coordinate routing of larger conduits (3" and larger) with other trades and with Field Engineer prior to installation.

H. Contractor shall provide sleeves or reinforced concrete boxed out openings through footings for all underground conduits. Coordinate with General Contractor.

I. Securely fasten conduit and raceways with malleable iron clamps (hot dipped galvanized, with clamp backs), or galvanized unistrut and hangers with suitable fastenings for all indoor dry applications. Utilize stainless steel unistrut and clamps for all exterior applications as well as damp or corrosive indoor applications such as below grade spaces and chemical rooms or pipe galleries as shown on drawings. The intent is to keep an air gap between conduit and finished wall surfaces to reduce the potential of moisture induced corrosion. All anchors shall be lead, expansion type with stainless steel hardware. Route all conduits parallel to and at right angles to building lines. Conduits mounted directly in contact with wall surface will not be acceptable.

J. Route conduit continuous from outlet to outlet, outlet to cabinets, outlet to pull or junction boxes. Secure conduit to all boxes with locknuts and bushings in such manner that each system is electrically continuous throughout.

K. Surface mount conduit in all areas, unless noted otherwise. All conduits and outlet boxes on the building exterior shall be flush mounted where possible. If not, install conduits within the building and then penetrate the wall directly into the back of light/outlet/etc. Intent is to eliminate/minimize the usage of surface mounted conduit on the exterior face of the building.

L. Cast in Place Conduit Installation Requirements: Contractor is encouraged to install conduits below grade and under concrete floor slabs to feed process equipment wherever possible. Do not route conduits through wet wells, clearwells, underground tanks, etc. unless required to feed equipment located within the same. Use PVC coated RMC sweeps whenever penetrating concrete floors or through below grade footings, etc. Schedule 40 PVC conduits shall be allowed under concrete floor slabs and in concrete encased ductbank for shielded signal circuits only. VFD output, non-shielded signal and telephone circuits shall always be installed in rigid steel conduit, unless specifically noted otherwise on the Drawings or unless a specialty cable such as shielded VFD output cable is utilized for the installation. All transitions from below grade PVC

back to rigid steel before exposing above grade shall be made via below grade transition couplings and PVC coated rigid steel elbows/sweeps.

M. Cap ends of conduit to prevent entrance of foreign materials during construction.

N. Locate conduits poured in concrete entirely in the middle 1/3 of the concrete member.

O. Provide a 4 inch high watertight barrier for conduits that pass vertically through a floor with a metal sleeve or concrete curb. Provide “link seal” around all conduits penetrating exterior walls/foundations and wet wells. Nuts on link seal shall remain accessible from inside the building once link seal is installed. Non shrinking grout is acceptable for penetrations above finished grade.

P. Provide watertight installation where conduits pass through roof, wall or waterproofing membranes.

Q. Conduit systems must be installed complete before conductors are pulled in.

R. Repair any damage done to insulation or interior vapor barrier where any conduit enters air plenums.

S. Fill conduits which can admit air to or release air from air plenums through the connecting conduit system with sealing compound.

T. Provide firestopping around all conduits penetrating fire rated walls as determined by the Architect and Engineer.

3.2. CONDUIT IDENTIFICATION

A. Each conduit shall be identified using a permanent identification system consisting of 304 stainless steel marker plates, tags, and cable ties for circuits leaving any equipment in plant control room.

B. The following information shall be provided on each conduit label:

1. Line #1 - Conduit ID found on the Cable and Conduit Schedule (where applicable)
2. Line #2: From: XXX
3. Line #3: To:XXX

C. The conduit identification system shall be equal to Pan-Steel Stainless Steel system as manufactured by Panduit.

3.3. ELECTRICAL METALLIC TUBING

A. Electrical metallic tubing (EMT) is not approved for use in any areas of this project.

3.4. ALUMINUM CONDUIT

A. Aluminum conduit not permitted unless specifically called for on the drawings.

3.5. FLEXIBLE METAL CONDUIT: (PVC JACKETED)

A. Use rain tight flexible metal conduit with rain tight fittings for final connections to motors (non hazardous areas), and fixed control devices (non hazardous areas) that do not come with factory installed cords. Minimum trade size is 3/4-inch.

B. Use Class I, Division 1, Group D flexible metal conduit with listed fittings for final connections to motors (hazardous areas), and fixed control devices (hazardous areas). Minimum trade size is 3/4-inch.

C. Provide sufficient length conduit to avoid transmission of vibration and noise, 12 inch minimum.

3.6. RIGID NON METALLIC CONDUIT (HEAVY WALL)

A. Use rigid non metallic, Schedule 80 PVC conduit for all direct burial and exposed wet, caustic or corrosive installations unless specifically noted otherwise on Drawings. Cut conduit square with round edges removed from ends to protect the wires from abrasion. Make connections by solvent welding. Install fittings in accordance with the manufacturer's recommended procedures. All elbows 2” and larger shall be rigid metal conduit. Provide expansion joints wherever there are long runs of conduit and a wide temperature differential exists. Use PVC coated RMC sweeps whenever penetrating through concrete floors.

B. Provide grounding conductor in all control circuit, branch circuit and feeder conduits.

C. Typical applications included underground and in chemical or caustic areas.

3.7. RIGID METAL CONDUIT (HEAVY WALL)

A. Use rigid metal conduit throughout entire project unless other types of conduit are specifically called for on Drawings or elsewhere in these specifications. Intent is to use RMC conduit everywhere except below finished grade. Fittings type to be threaded. Use **threaded hubs** (equal to Myers hub) where rigid conduit is connected to a thread less box or enclosure for indoor and outdoor applications. Lock nut with O-Ring is not an acceptable alternative.

B. Paint conduit that is in contact with earth with heavy coat of bitumastic paint. Paint couplings after assembly. Where bitumastic paint is applied the paint must be thoroughly dried before backfilling.

END OF SECTION

Division 16 - Electrical

SECTION 16220 - POWER AND INSTRUMENTATION CABLE - LESS THAN 600V

PART 1 GENERAL

1.1. SUMMARY

A. Section Includes:

1. Conductors for circuiting, control, and power distribution.

B. Related Work:

1. Section 16210 - Conduit

1.2. REFERENCE STANDARDS:

A. U.L. 486A – 486B Wire connectors

B. NEMA WC70

C. NEMA WC30-1976

D. NFPA 70 (National Electrical Code)

1.3. DELIVERY, STORAGE, AND HANDLING:

A. Deliver conductors to project on standard coils or reels and suitably protected from weather and damage during storage and handling.

1.4. APPROVAL DRAWINGS

A. Provide Shop Drawings on all products identified herein.

PART 2 PRODUCTS

2.1. CONDUCTORS

A. Type P1 - 600V Rated General Purpose Single Conductor Cable

1. Construction:
   a. No. 14 AWG and larger: Stranded Copper, (THHN/THWN-2). Solid Copper is acceptable for lighting and branch circuits.
   b. All conductors shall contain factory color coded insulation in all standard colors to match the voltage level used.
   c. Sequential footage markers shall be factory installed on the insulation jacket.
   d. Provide Cable Tray (CT) rated cable where installed in cable tray.
   e. Aluminum conductors not permitted.
2. Feeder Conductors:
   a. 98 percent conductivity copper, 600 volt insulation.
3. Branch Circuit Conductors:
   a. 98 percent conductivity copper, 600 volt insulation.

b. Conductors smaller than No. 14 AWG not permitted except in control panel.

4. Project Use Areas:
   a. All general use indoor building circuiting.
   b. Not allowed for VFD output circuitry.
5. Manufacturer:
   a. Service Wire Co.
   b. Okonite Co.
   c. Southwire
   d. Belden
   e. Alpha Wire

B. Type P2 - 600V Rated Special Purpose Single Conductor Cable

1. Construction:
   a. XHHW-2 insulation which is moisture, heat, and flame retardant cross-linked polyethylene covered with a overall flame retardant, moisture and sunlight resistant PVC jacket.
   b. Stranded Copper
   c. All conductors shall contain factory color coded insulation in all standard colors to match the voltage level used.
   d. Sequential footage markers shall be factory installed on the insulation jacket.
   e. Provide Cable Tray (CT) rated cable where installed in cable tray.
   f. Aluminum conductors not permitted.
2. Project Use Areas:
   a. All 600V and less service entrance conductors and feeders routed underground from the exterior to the interior.
3. Manufacturer:
   a. Service Wire Co.
   b. Okonite Co.
   c. Southwire
   d. Belden
   e. Alpha Wire

C. Type S1 - Signal Cable - Single Pair - Shielded/Twisted

1. Construction
   a. #16 AWG stranded (7x24) bare copper conductors, twisted pairs, PVC/Nylon insulation, PVC jacket.
   b. 600V rated
   c. Conductors shall be shielded with a 0.35 x 5 mil (min.), 100% coverage, aluminum or copper mylar tape shield, or equal with an #18 AWG tinned copper drain wire
   d. Conductors shall be black and white in color and be numbered sequentially.
   e. Suitable for indoor, outdoor, and direct burial applications.
   f. The standard application shall be considered non-plenum rated. Provide plenum rated cable as required for the particular application.

2. Ratings/Listings:
    a. Flame Resistance: Comply with UL 1685
    b. UL Temperature Rating: 75°C (167°F) Dry, 90°C (194°F) wet
    c. ICEA S-73-532, S-61-402
    d. Shall be suitable to be installed in Cable Tray and be Exposed Run Rated (TC-ER)
3. Project Use Areas:
    a. Use cable for control circuiting requiring one shielded twisted pair from a control panel to a field instrument or similar application.
4. Manufacturer:
    a. Service Wire Co.
    b. Okonite Co.
    c. Southwire
    d. Belden
    e. Alpha Wire

D. Type S4 - Magnetic Flowmeter Transmitter Cable

1. Furnish and install new continuous length of signal cables between magnetic flowmeters and transmitters as indicated on the Drawings. Coordinate scope and supply with magnetic flowmeter systems manufacturer.
2. No splices shall be allowed in these types of signal cable installations. The length of signal cables shall be installed in one continuous length from flowmeter to transmitter.
3. Assumed Cable Manufacturer / Type for Bidding Purposes:
    a. Coil Drive Cable: #14 AWG Belden 8720, Alpha 2442, or manufacturer approved equivalent.
    b. Signal Cable: #20 AWG Belden 8762, Alpha 2411, or manufacturer approved equivalent.
    c. Combination cable is acceptable if it meets individual specifications of signal and coil drive cables and the manufacturer.
    d. Confirm all proposed cables with Manufacturer of equipment before installation. In the majority of installations, the manufacturer of the flowmeter equipment furnishes the required specialty flowmeter cables for installation by the Contractor. It is the Contractor's responsibility to confirm and coordinate the exact requirements.

E. Type D3 – CAT 6 Shielded Ethernet Cable

1. EIA/TIA Category 6, 4-pair, #23 AWG, and a 600V rating
2. FEP Teflon plenum rated premise wiring cable where required.
3. Characteristics:
    a. Industrial grade PO insulation
    b. Minimum of 100% overall foil shielding coverage
    c. PVC inner and out jackets

d. Outdoor rated

4. Category 6 cables shall be terminated in eight-conductor TIA-568-B CAT6, RJ-45 compliant snagless modular connectors.
5. The cable jacket and RJ45 terminator color shall be:
   a. SCADA Network: Black Jack with Red adhesive jack label
   b. Admin Network: Black Jack with Blue adhesive jack label
   c. BAS/Security Network: Blue
6. Project Use Areas:
   a. Network circuiting as defined on the cable and conduit schedule
7. Manufacturer:
   a. Belden 7953A

F. Type A1 – Antenna Cable

1. Cabling runs of more than 150’:
   a. Andrew AVA5-50FX
   b. Prior-approved equal.
2. Cabling runs of more than 50' and less than 150':
   a. Times Microwave Systems LMR-600.
   b. Prior-approved equal.
3. Cabling runs of less than 50’:
   a. Times Microwave Systems LMR-400.
   b. Prior-approved equal.
4. Short antenna feeder/jumper runs:
   a. Times Microwave Systems LMR-200.
   b. Prior-approved equal.
5. Connections shall be N-Type except for connections to the Radio (SMA).
   a. Connectors must be installed by qualified personnel with experience with radio telemetry equipment.
6. Antenna cable jumpers shall be manufactured cable set with factory installed ends. Cable for jumpers to be minimum of RG-6.
7. Connection points outside of buildings shall be weather proofed using cold shrink kits as per manufacturer’s instructions.
   a. Weather proofing materials must be designed to resist water and UV light.
8. Project Use Areas:
   a. SCADA radio antennae circuiting as defined on the cable Drawings.
9. **Antenna cable shall be provided by the systems integrator.**

2.2. CORD CONNECTOR GRIPS

A. Manufacturer: Eaton Crouse-Hinds CGB

B. Type: Aluminum cord connector, stainless steel mesh grips, straight or 90° as required in eliminating sharp cable bending radii.

C. Use: To support all cables/cords from the enclosure at their point of use and/or wherever cables/cords enter or leave the bottom of conduit risers (above grade). Required for all cord connections to motors or enclosures.

2.3. BOLTED, PRESSURE TYPE CONNECTORS

A. Manufacturer: Burndy or equal

B. Use: Connecting conductors to busbars, suitable for copper and aluminum conductors.

C. Size: As required for conductor.

2.4. SOLDERLESS CONNECTORS

A. Manufacturer: 3M "Scotchlok" or equal

B. Type: Twiston, spring tension.

C. Use: With copper conductors only.

PART 3 EXECUTION

3.1. INSTALLATION

A. Conductors shall be installed within conduit or approved raceway unless noted otherwise.

B. Draw conductors into conduit only after conduit system is complete. Install in a manner so as not to injure insulation.

C. Use stranded, copper conductors only. Solid conductors are not acceptable.

D. Make splices on branch circuit conductors with solderless stapleless, mechanical wire connectors.

E. Tighten bolted, pressure type connectors to manufacturer's recommendations.

F. No. 10 AWG and smaller shall be stranded copper for all motor and control circuits. Branch circuits for lighting and convenience outlets shall be solid copper.

G. All branch circuit homeruns greater than 50 feet shall be #10 minimum.

H. All multiwire branch circuits shall have their neutral conductor increased 1 size relative to the phase conductors (i.e. if the phase conductors are #12 AWG, then the neutral shall be #10 AWG).

I. Make splices and terminations in control panel by using bolted, pressure type connections. Install according to manufacturer's recommendations.

J. Provide strain relief cord connectors and stainless steel mesh on all cords entering motor termination boxes, junction boxes or conduits.

K. Use factory color coded conductors with separate color for each phase and neutral conductor by integral pigmentation for all conductor sizes.

L. Use following codes:

CONDUCTOR SYSTEM VOLTAGE-120/208, THREE PHASE

Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	White
Equipment Ground	Green

CONDUCTOR SYSTEM VOLTAGE-120/240, THREE PHASE

Phase A	Black
Phase B	Orange
Phase C	Blue
Neutral	White
Equipment Ground	Green

CONDUCTOR SYSTEM VOLTAGE-120/240, SINGLE PHASE

Phase A	Black
Phase B	Red
Neutral	White
Equipment Ground	Green

CONDUCTOR SYSTEM VOLTAGE-277/480, THREE PHASE

Phase A	Brown
Phase B	Orange
Phase C	Yellow
Neutral	Gray
Equipment Ground	Green

M. Lace or clip groups of feeder conductors in control panel, pull boxes, and wireways.

N. Use wiring pulling lubricant for pulling No. 4 AWG and larger wire.

O. Splice only in accessible junction or outlet boxes.

P. <u>VFD Output Circuit Requirements:</u>

1. VFD output circuits shall be installed via one of the following methods at the Contractor's option:
   a. Building wire in dedicated rigid steel conduit.
      1) Type P1 cable is not acceptable.
      2) Must be one of the following types:

(a) RHH
(b) RHW
(c) RHW-2
(d) XHH
(e) XHHW
(f) XHHW-2
(g) Other approved types according to NFPA 79 and other applicable standards.

b. Type P4 Specialty shielded VFD cable in Sch. 80 PVC conduit below grade, and rigid metal/aluminum conduit above grade.

2. The ground conductor(s) from the VFD output shall be bonded to the motor frame or motor/equipment ground lug.
3. Each VFD output circuit shall be installed in its own dedicated conduit. No sharing of circuitry with VFD output power conductors in a common conduit or raceway system is allowed.
4. Ensure submersible well casing has been bonded to the VFD ground in accordance with manufacturer requirements, and applicable standards.
5. VFD output circuitry shall be installed to minimize their proximity to other power, signal and control circuits. A minimum separation of 6 inches is suggested between exposed VFD output circuits and other circuits in junction boxes, panels, MCCs, etc. Long parallel runs (10 feet or longer) of VFD output conductors with other circuits are not suggested or allowed. Maximum separation (more than 6”) and maximum shielding (via metal conduit or shielded output cable) methods of installation shall be utilized wherever possible. Extra costs for installation revisions due to the inadequacy of the installed VFD output circuit separation and shielding will not be considered. It is the Contractor’s responsibility to provide a complete and fully functioning VFD system with no output circuit interference, noise, crosstalk, etc.

3.2. CABLE TESTING

A. Type D3 - Telephone and LAN Category 6 Cable Testing

1. Perform end to end tests of each voice and data cable installed as follows:
   a. Pair/conductor for proper pinouts and continuity.
   b. Ground fault.
   c. Proper termination, shorts and crossed pairs.
   d. Channel attenuation per ANSI/TIA/EIA-568-A-5 and TSB-95.
   e. Channel bidirectional worst case near end cross talk (NEXT) at frequencies up to 100 MHZ, per the standards listed in Item 4.
   f. Measured and documented effective cable run length for each circuit.
   g. Submit record of test results to Owner and Engineer.

END OF SECTION

Division 16 - Electrical

SECTION 16250 - LABELING AND EQUIPMENT IDENTIFICATION

PART 1 GENERAL

1.1. SUMMARY

A. Section Includes:

1. Equipment to be identified includes panelboards, disconnects, transformers, relays, contactors, system control panels, variable frequency drives, separately mounted control stations, pilot lights, control switches and all wires and terminations.

B. Related Work:

1. Section 16420 - Panelboards

PART 2 PRODUCTS

2.1. INSTRUCTION SIGNS

A. Plastic sandwich-type construction of contrasting colors. Engraving through top layer exposes inner layer.

B. Color: Black with white letters.

C. Letters: 1/8-inch height, standard block type.

D. Punched or drilled for mechanical fasteners. Fasteners shall be self tapping stainless steel screws with nuts and flat lock washers.

2.2. EQUIPMENT IDENTIFICATION LABELS

A. Sel-adhered, engraved, laminated acrylic or melamine label.

B. Color: Black with white letters.

C. Letters: 3/8-inch minimum height, standard block type.

D. Punched or drilled for mechanical fasteners. Fasteners shall be self tapping stainless steel screws with nuts and flat lock washers.

2.3. WIRE MARKERS

A. Wires requiring circuit indication shall be permanently fastened type written. Handwritten labels shall not be acceptable.

B. Wire markers shall be Shrink Tube or Self Laminating type.

C. Shrink Tubing type wire markers:

1. Shrink tube type markers shall be type written with circuit indication.
2. 3:1 heat-shrinking type
3. Resistant to chemicals, grease, oil and cleaning agents.
4. Material shall be Polyolefin with smudge-proof finish.

5. Material shall be cold resistant and flame-retardant
6. Temperature range: -67 to 275 degrees Fahrenheit.
7. Manufacturer: Brady

D. Self-laminating type wire markers:

1. Self-laminating type markers shall be type written with circuit indication
2. Vinyl label with acrylic adhesive
3. Label shall have overlaminate included sized appropriately to wrap cable one and a half times or completely cover printed area, whichever is greater.
4. Label shall be rated for indoor and outdoor use.
5. Temperature range: -94 to 140 degrees Fahrenheit.
6. Material shall be flame-retardant.
7. Resistant to chemicals, humidity, oil, water and weather.
8. Manufacturer: Brady

2.4. WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated. Weather resistant, non fading, metal backed or baked enamel signs to be used for outdoor installations.

2.5. POWER SOURCE LABELS FOR EQUIPMENT AND DEVICES

A. Self-adhered label, installed on the front cover, door, or other access to equipment and devices unless otherwise indicated. Weather resistant, non fading, metal backed or baked enamel signs to be used for outdoor installations.

B. Manufacturer: Brady or equal.

C. Apply to all panels, junction boxes, receptacle faceplates, switch faceplates, front covers, doors, or other access to equipment unless otherwise indicated. See Part 3 for Execution.

2.6.

PART 3 EXECUTION

3.1. INSTALLATION

A. Clean surface before installation of self-adhered labels.

B. Identify with black acrylic based placard with white engraved letters mounted with drive pins or other approved fasteners.

3.2. DISCONNECTS AND STARTER ENCLOSURES

A. Use the following for identifying disconnects or starter enclosures per NEC 110.22 (A).

1. EXAMPLE: Raw Wastewater Pump #1
480 volt, 3 phase, 300 H.P.
Fed from: DP-X, Pole Position XX

3.3. SWITCHBOARDS, MCC & PANELBOARD LABELING

A. Label per NEC Article 408.4 (A) & (B) and with the following information: Panel name, voltage, phase and amperage/type of main.

1. EXAMPLE:
Panel L: Fed From: DP-X
120/208 volt
Three phase
225 amp Main Circuit Breaker

B. Provide each panelboard with a typed directory, with clear plastic cover, of circuits describing loads served.

C. Markings shall be plainly visible, fit over the insulation of the conductor and begin 1/8” from where the insulation begins.

D. Wire markers shall be placed on both ends of wires prior to termination.

E. Wiring shall be checked for circuit completeness to verify correct circuiting, identification and labeling at the terminals. Terminal markings and wire markings shall match record schematics.

F. Hand lettering of identification not permitted. Completely remove temporary labels used during construction and repaint surfaces if required.

3.4. POWER SOURCE LABELS FOR EQUIPMENT AND DEVICES

A. Provide a mechanically fastened power source label at equipment and devices with the following information:

1. EXAMPLE: LPA-11 or LPA-13,15 or DPA-1,3,5.

B. Equipment and devices such as panels, junction boxes, receptacle faceplates, switch faceplates, front covers, doors, or other access to equipment shall include an adhesive backed label that indicates the power source.

3.5. CONDUIT AND CIRCUIT LABELING AT POINT OF ENTRY TO LARGE ENCLOSURES

A. Use a black permanent marker to hand label conduits and circuits at the point of entry to large enclosures (control panels, pullboxes, junction boxes, motor control centers, etc.) with the conduit/circuit number from the cable and conduit schedule.

B. Labeling shall be on the interior of the enclosure or on the floor near each conduit/circuit, or on the conduit. Conduits/circuits that enter enclosures shall be labeled.

C. Labeling with a permanent marker shall be in addition to circuit tags installed around the cables themselves.

3.6. GROUNDED (NEUTRAL) CONDUCTOR IDENTIFICATION

A. Identify grounded conductors in accordance with NEC 200.6.

B. In addition to the part (D) identification requirements for the grounded conductor when different systems are in close proximity - Example: Non-Emergency UPS and Utility power sharing a common junction box or multi-channel raceway. Where broken, to prevent crossing of grounded/neutral conductors, the non-utility system's neutral wires shall have wire markers identifying it as the system to which it belongs.

3.7. DRY TYPE TRANSFORMER

A. Label per NEC Article 450.11 and with the following information: Transformer name, power source and circuit number, and loads served.

1. Example: XFMR-1
   Fed from: DP-X-12,14,16
   Feeds LP-X

END OF SECTION

Division 16 - Electrical

SECTION 16260 - GROUNDING

PART 1 GENERAL

1.1. SUMMARY

A. Section Includes:

1. Furnish and install a complete grounding system for all electrical equipment at the facility and for each antenna mast. Also, provide equipotential ground loop around perimeter of building(s) where shown on the Drawings and bond to main service equipment. Furnish and install accessible ground bars and ground test wells throughout the facility at locations indicated on the Drawings.

B. Related Work:

1. Section 16150 - Motors
2. Section 16210 - Conduit
3. Section 16220 – Power and Instrumentation Cable - Less than 600 Volts
4. Section 16420 - Panelboards
5. Section 16455 - Wiring Devices

1.2. DESCRIPTION OF SYSTEM

A. Bond electrical equipment, control panels, panelboards, etc. to the metallic conduit system through conduit connectors or bonding jumpers, as required, to provide effective electrical continuity.

1.3. QUALITY ASSURANCE

A. NFPA - 70, Article 250.

PART 2 PRODUCTS

2.1. GROUNDING CONDUCTORS

A. Copper, with green identification as specified in Section 16220.

2.2. GROUND RODS

A. Type: Copper clad steel, 5/8-inch diameter, 10 feet long.

2.3. GROUND CLAMPS (CONCEALED)

A. Compression type grounding which meets IEEE 837

B. Manufacturer: Panduit StructuredGround

2.4. GROUND FITTINGS AND LUGS (EXPOSED)

A. Manufacturer: Equal to Burndy Company

2.5. GROUND LUG

A. Located in electrical equipment as indicated on the Drawings.

PART 3 EXECUTION

3.1. POWER SYSTEM GROUNDING

A. Distribution System

1. Install grounding bars and grounding studs at locations indicated within the facility, distribution centers, pull boxes and panelboards. Bond all metallic conduit systems and metallic piping with metallic clamps and bonding conductor for ground continuity.

B. Provide a properly sized copper grounding conductor in all branch circuit and feeder conduits. Size the conductor according to Table 250-122 of the National Electric Code. Connect the grounding connector to grounding points (grounding bars, ground studs, etc.) in all electrical enclosures, electrical equipment, junction boxes and outlet boxes.

C. Ground and bond in accordance with National Electric Code, Article 250.

END OF SECTION

Division 16 - Electrical

SECTION 16310 – ELECTRICAL SERVICE

PART 1 GENERAL

1.1. SUMMARY

A. Montana Dakota Utilities (MDU) will provide a new 277/480V, 3PH, 4W Service.

B. Associated Charges:

1. All charges payable to MDU shall be paid by the Owner outside of this Contract.

1.2. QUALITY ASSURANCE

A. NFPA 70 – National Electrical Code.

1.3. EXISTING CONDITIONS

A. Contact the Utility Company for verification of the exact connection point for each service required.

PART 2 EXECUTION

2.1. INSTALLATION

A. Verify requirements and installation locations with Utility Company before installation.

B. Terminate rigid metallic service conduit (if used) in transition cabinet, meter socket, and combination main switch/automatic transfer switch with grounding bushing.

C. Make ground connection from bushing to ground bus.

D. The serving electric Utility Company is:

1. MDU
   a. Attn: Loni Wortham
   b. Phone: 701-713-0533
   c. Email: loni.wortham@mdu.com

E. All work will be coordinated with Utility and Owner and scheduled for minimum of service interruption.

F. Summary of Site Electrical Service Installation:

1. ~~Primary circuitry (cable and conduit) and associated trenching by serving electric utility.~~
2. Site preparation and transformer pad by Electrical Contractor in accordance with utility standards.
3. Transformer provided and installed by serving electric utility. Terminations, primary and secondary, by serving electric utility.

1. Primary circuitry cable and associated trenching by serving electric utility. Conduit by contractor in accordance with serving utility standards.

4. Circuitry between utility transformer and utility disconnect (non-fused) by serving electric utility. Utility disconnect provided by Electrical Contractor and mounted in accordance with serving utility standards. Utility disconnect shall be 400A 3P 4W heavy duty NEMA 3R disconnect, 600V rated.

4. ~~Circuitry between utility transformer and utility disconnect by serving electric utility. Cold sequence utility disconnect provided by Electrical Contractor and mounted in accordance with utility standards. Utility disconnect shall be 400A 3P 4W heavy duty NEMA 3R disconnect, 600V rated.~~

6. Circuitry between utility disconnect and meter socket shall be by Electrical Contractor.

5. Terminations within utility disconnect shall be by serving electric utility.

6. ~~Circuitry between utility disconnect and meter socket shall be by serving electric utility.~~

7. Meter socket provided by electrical contractor in accordance with utility standards. Meter head provided by serving electric utility.

8. Primary and secondary terminations at meter socket by Electrical Contractor.

8. ~~Primary terminations by serving electric utility. Secondary terminations and cable by Electrical Contractor~~.

9. All work downstream of disconnect shall be by Electrical Contractor.

END OF SECTION

Division 16 - Electrical

SECTION 16420 - PANELBOARDS

PART 1 GENERAL

1.1. SUMMARY

A. Section Includes:

1. Furnish and install circuit breaker type panelboards for branch circuit distribution to lighting, general receptacle and small motor loads.

B. Related Work:

1. Section 16210 – Conduit
2. Section 16220 – Power and Instrumentation Cable – Less than 600V
3. Section 16250 – Labeling and Equipment Identification

1.2. QUALITY ASSURANCE

A. NEMA PB-1

B. U.L. listed

1.3. SHOP DRAWINGS AND PRODUCT DATA

A. Submit in accordance with Specification Section 01300 – Submittals.

B. Clearly indicate (for each panelboard) amperage and phase of main bus, amperage of main circuit breaker, wire size and quantity of main lugs, grounding bar location, neutral bar location, quantity, arrangement and amperage of branch circuit breakers, quantity of spaces, physical dimension of enclosure, weight, directory card location and type, type of lock, flush or surface cover, short circuit withstand rating in R.M.S. amperes.

1.4. DELIVERY, STORAGE AND HANDLING

A. Box, crate, or otherwise completely enclose and protect all equipment during shipment, handling, and storage.

B. Protect equipment from exposure to elements and keep all items thoroughly dry at all times.

C. Store in a dry area, protected from the weather.

D. Painted Surfaces: Protect against impact, abrasion, discoloration, and other damage.

1.5. OPERATION AND MAINTENANCE DATA

A. Include manufacturer's instructions in accordance with Specification Section 01730 – Operation and Maintenance Data for maintenance,

including cleaning, tightening conductor connections, testing, and addition or replacement of circuit breakers.

PART 2 PRODUCTS

2.1. LIGHTING AND APPLIANCE PANELS (120/208V OR 120/240V)

A. Utilize lighting and appliance panels (denoted by L prefix) for 120/208 volt, 3 phase operation or 120/240V for single phase operation as indicated on the Drawings. Install bolt-on, thermal magnetic circuit breakers with a minimum interrupting rating of 22,000 amperes R.M.S. unless noted otherwise on Drawings.

B. Circuit breakers shall have a trip indication different from the "off" or "on" position.

C. Install in a NEMA 1 surface mount enclosure, unless indicated otherwise on the Drawings. Provide a hinged front breaker access door and a separate hinged front cover (two separate hinges) for personnel/contractor access without completely removing front panelboard cover.

D. Install common trip multipole circuit breakers. Handle ties are not permitted.

E. Full cabinet height bussing includes active, spare and blank breaker locations with sizes, branches, mounting, main circuit breakers, etc., as shown in Schedule on the Drawings.

F. Provide adequate wiring space according to the National Electric Code.

G. Provide panels with a flush, hinged door with lock. Key locks alike.

H. Isolated neutral bar and ground bar in all panelboards. Provide 200% rated neutrals where indicated on the Drawings.

I. Provide distributed phase bussing.

J. Metal framed circuit directory and card with plastic covering located on the inside.

K. Tin plated copper bussing, SPD protection and additional requirements as noted on Panelboard “L” Schedule on Drawings.

L. Provide an integral SPD type surge protective device per Section 16433 on all panelboards where defined on the drawings. SPD shall have breaker sized per manufacturer recommendations.

2.2. MANUFACTURERS

A. Lighting and Appliance Panels (L Prefix):

1. Square D Type NQ

2. General Electric equal
3. Siemens equal
4. ABB
5. Cutler Hammer equal

2.3. CABLE TIES

A. Equal to Thomas and Betts "TY-RAP"

PART 3 EXECUTION

3.1. INSTALLATION

A. Install all panelboards plumb with top at 72” above the finished floor.

B. Type circuit directory with spare positions left blank. Hand lettering not acceptable.

C. Carefully clean panelboard to remove all wire scraps, dirt and dust.

D. Neatly dress conductors and bundle with nylon cable ties.

E. Tighten all lugs and bolts to manufacturer's recommendations.

F. Use touch up paint, as recommended by the manufacturer, to repair scratches and other surface defects.

G. Install SPD as recommended by the manufacturer at each project panelboard. Install with leads as short as possible.

H. All wire terminations shall be torqued to manufacturer recommendations and lugs marked with paint for future reference.

END OF SECTION

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Division 16 - Electrical

SECTION 16433 - SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.1. SUMMARY

A. This section describes the materials and installation requirements for Surge Protective Devices (SPD) shown on the drawings and herein specified.

1.2. REFERENCES AND QUALITY ASSURANCE:

A. IEEE C62.41, C62.45-2002, and C62.62-2018

B. National Electrical Manufacturers Association (NEMA LS1)

C. National Fire Protection Association (NFPA 70)

D. Underwriters' Laboratories (UL 1449 3rd Ed. and 1283)

1.3. SUBMITTALS

A. For each SPD device indicated:

1. Product Data Sheets in NEMA LS-1 format - Publication for Low Voltage Surge Protection Devices (SPDs).
2. Electrical/mechanical drawings showing unit dimensions, weights, installation instructions details, and wiring configuration.
3. UL 1449 Edition 3 Listing Certificate.
4. UL 1449 Edition 3 Suppressed Voltage Ratings.
5. Independent let through voltage test results to ANSI IEEE C62.41 Cat C3 high energy impulse(20kV,10kA), B3 ring wave (6kV, 3kA).
6. Copy of warranty statement clearly establishing the terms and conditions to the building/facility owner/operator.
7. Copies of Noise Rejection testing as outlined in NEMA LS1-1992 (R2000) Section 3.11. Noise rejection is to be measured between 50kHZ and 100MHz verifying the devices noise attenuation. Must show multiple attenuation levels over a range of frequencies.

1.4. MANUFACTURES QUALIFICATIONS

A. Manufacturers shall be ISO9000 certified.

B. Manufacturers shall have been engaged in the design and manufacturing of such devices for at least ten (10) years.

C. SPD shall be UL 1449 current edition listed, 20kA In Type 1 or Type 2 for use in UL 896A systems.

D. The following manufacturers will be approved, provided they meet all specifications:

1. ERICO Inc.
2. Eaton equivalent
3. Square D equivalent
4. ABB
5. Or prior approved equal.

1.5. WARRANTY

A. The manufacturer shall warrant the SPD against defects in material and workmanship for period of 10 years.

PART 2 PRODUCTS

2.1. GENERAL ELECTRICAL REQUIREMENTS

A. Unit operating voltage- Refer to drawings for operating system voltage.

B. Maximum continuous operating voltage (MCOV)- the MCOV shall not be less than 115% of the nominal system operating voltage.

C. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards. End of life mode to be open circuit. Unit with end of life short-circuit mode are not acceptable.

D. SPD shall include L-G, L-N, and N-G modes of protection for wye systems at minimum. Delta power systems shall include L-L and L-G modes of protection at minimum.

E. Nominal Discharge Current (In) - All SPDs applied to the distribution system shall have a 20kA In rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an In less than 20kA shall be rejected.

F. Electrical Noise Filter - Each Type 2 unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10 kHz to 100 MHz using the MIL-STD-220A insertion loss test method. Products unable to meet this specification shall not be accepted.

1. Type 2 units with filtering shall conform to UL 1283 5th Edition
2. Type 1 units shall not contain filtering or have a UL 1283 5th Edition Listing.

G. Internal Connections - No plug-in single-mode modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.

H. Monitoring Diagnostics - Each SPD shall provide the following integral monitoring options:

I. Remote Status Monitor- The SPD must include Form C dry contacts (one NO and one NC) for remote annunciation of its status. Both the NO and NC contacts shall change state under any fault condition. A reduction in capacity below the manufacturer’s predetermined level shall operate an alarm contact.

J. Surge Counter- The SPD shall be equipped with an LCD display that indicates to the user how many surges have occurred at the location. The surge counter shall trigger each time a surge event with a peak current magnitude of a minimum of 50 ± 20A occurs.

1. The ongoing surge count shall be stored in non-volatile memory. If power to the SPD is completely interrupted, the ongoing count indicated on the surge counter’s display prior to the interruption shall be stored in non-

volatile memory and displayed after power is restored. The surge counter's memory shall not require a backup battery in order to achieve this functionality.

K. The SPD shall have a maximum continuous operating voltage (MCOV) of:

POWER SYSTEM	**MCOV (L-N)**
Single phase (3W+G) 120/240 WYE	150V
Three phase (4W+G) 120/208 WYE	150V
Three phase (4W+G) 220/380 WYE	320V
Three phase (4W+G) 277/480 WYE	320V
Three phase (4W+G) 347/600 WYE	485V
Three phase (3W +/-G) 240V Delta	270V L-L
Three phase (3W +/-G) 480V Delta	550V

L. The following Voltage Protection Rating (VPR) L-N, L-L For Delta, shall not be exceeded by the SPD:

Impulse Standard	120/240V	120/208V	220/380V	277/480V	240V Delta
ANSI/IEEE C62.41	<650V	<650V	<1000V	<1000V	<1000V
Cat B3	6kV	6kV	6kV	6kV	6kV
ANSI/IEEE C62.41	<1400V	<1400V	<1800V	<1800V	<1800V
Cat C3	20kV	20kV	20kV	20kV	20kV

2.2. LIGHTING PANELS (UL TYPE 2)

A. SPD shall be installed at additional specific locations as shown on drawings or indicated on the panelboard schedules.

B. SPD shall provide 60kA 8/20µs surge rating per mode, min.

C. SPD shall be capable of withstanding multiple temporary over voltage per UL 1449 Ed 3 without failure or need to reset or replace modules/fuses.

D. Independent certification shall be provided proving that the SPD meets a single shot surge rating of at least 60kA 8/20µs per mode, without failure of the fuse, disconnect or surge module. Bypassing of fusing/disconnects for purpose of this test is not acceptable.

E. Each mode of the SPD shall be rated to exceed the life cycle testing of ANSI/IEEE C62.45 by withstanding at least 10,000 operations at 6kV and 500A B3 Ringwave without failure.

F. SPD shall be internally line fused and be UL Listed for use on circuits with short circuit fault current rating (SCCR) of 200 kA. These fuses to be field replaceable with indication to warn if fuse has ruptured. Unit shall not require external fuses/breaker for connection.

G. SPD shall be capable of withstanding multiple temporary over voltages per latest adopted UL 1449 edition without failure or need to reset or replace modules/fuses.

PART 3 EXECUTION

3.1. INSTALLATION

A. SPDs shall be factory installed within the noted equipment.

END OF SECTION

Division 16 - Electrical

SECTION 16455 - WIRING DEVICES

PART 1 GENERAL

1.1. SUMMARY

A. Section Includes:

1. Furnish and install all wiring devices and device plates where shown on the Drawings.

B. Related Work:

1.2. WORK INSTALLED BUT FURNISHED BY OTHERS

A. Where indicated, install devices supplied by Division 1 through 15.

1.3. QUALITY ASSURANCE

A. NEMA U.L. listed.

1.4. SHOP DRAWINGS AND PRODUCT DATA

A. Submit in accordance with Specification Section 01300 – Submittals. Clearly indicate device type, voltage, amperage, NEMA configuration, color.

1.5. DELIVERY, STORAGE AND HANDLING

A. Store in a dry area, protected from the weather.

1.6. OPERATION AND MAINTENANCE DATA

A. Submit in accordance with Specification Section 01730 – Operation and Maintenance Data, a list of all devices used, including manufacturer and type.

PART 2 PRODUCTS

2.1. DUPLEX RECEPTACLES: (SURFACE MOUNTED IN FINISHED AREAS)

A. Manufacturer: Equal to Hubbell #5352 Series, Slater #5352 Series, Bryant #5352, Leviton #5352, or Eagle #5352.

B. Type:

1. Specification grade
2. Gray in color (normal applications); yellow for UPS applications.
3. 20 ampere
4. 120 volt
5. 3 wire grounding

2.2.

GROUND FAULT RECEPTACLE

A. Manufacturer: P&S #2097, Eaton SGF20

B. Type:

1. 20 ampere capacity
2. Gray
3. 120 volt with 5 milliampere trip

2.3. TOGGLE SWITCHES

A. Manufacturer: Equal to P&S #20AC, Eagle 2221

B. Type:

1. Specification grade
2. Gray in color
3. 20 ampere
4. 120/277 volt
5. Quiet operation, keyed switch where indicated, single pole unless noted otherwise.

2.4. PILOT LIGHTED SWITCHES

A. Manufacturer: Equal to P&S #20AC1-RPL, Eagle 2221PL

B. Type:

1. Red in color
2. 20 ampere
3. 120/277 volt
4. Quiet operation

C. Neon type that is illuminated when switch is in the "on" position

D. Specification grade

2.5. PILOT LIGHTS

A. Manufacturer: Equal to Arrow Hart

B. Type:

1. Neon with red jewel

2.6. DEVICE PLATES

A. Provide device wall plates per Specification Section 16230 and as required by NEC.

2.7. WEATHERPROOF COVERS

A. Provide weatherproof device covers on all exterior devices, wet area devices, chemical room devices and in other areas indicated on the Drawings and as required by the NEC.

B. Unless indicated otherwise, covers shall be of the “weather protected while in use” variety and shall consist of the following:

1. Exterior Applications: cast aluminum, lockable, sized as required for the application. Manufacturer/Model: Intermatic / Type #WP10, or equal.
2. Wet, Chemical or Caustic Interior Areas: clear plastic or PVC construction, Carlon, Intermatic WP5100 Series, or equal.

2.8. CLASS I, DIVISION I, GROUP D OR CLASS I, DIVISION 2, GROUP D AREAS

A. All devices shown on Drawings to be located in areas that are noted as Class I, Division 1, Group D or Class I, Division 2, Group D shall be UL listed for use in the respective classified areas. Specifically all electrical within Odor and Corrosion Control room and within Wet Wells shall be Explosion proof, and wired per NEC 500 and NEC 501.

B. Toggle Switches:

1. Manufacturer: Appleton EDS Series or equal by Crouse Hinds or Killark.
2. Type:
   a. 20 amp
   b. 120/277 VAC
   c. Self sealing, or provide listed seal offs
   d. Class I, Div. 2, Groups B,C,D

C. Ground Fault Receptacles:

1. Manufacturer: Killark UGFI20C2 or equal Ark-Gard by Crouse Hinds, or U-Line by Appleton.
2. Type:
   a. GFCI protected
   b. 20 amp
   c. Class I, Div. 2, Groups B,C,D

PART 3 EXECUTION

3.1. INSTALLATION

A. Install devices and device plates where shown on the Drawings.

B. Provide blank plates for unused openings.

C. See Section 16250 - Labeling and Equipment Identification for engraving requirements for pilot lights and pilot lighted switches.

END OF SECTION

SECTION 16521

VARIABLE FREQUENCY DRIVES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. **The site elevation is approximately 1,850.00 feet above sea level. All equipment as noted within the Contract Documents shall carry a rating as indicated at this noted site elevation. The equipment manufacturers shall be responsible for applying all necessary altitude de-rating factors.**
2. Furnish and install adjustable frequency drive controllers (VFDs) for all motors as shown on the Drawings.
3. Supply of VFDs in the following applications as indicated on the Drawings:
   a. "Clean Power" VFDs"
      1) "Clean Power" VFDs shall utilize one of the input circuitry types listed below:
         (a) 18-pulse rectifiers, 18-pulse rectifiers shall be of the type with autotransformer frontends.
         (b) 6-pulse rectifiers with integral incoming harmonic filter as specified below.
         (c) Active Front End (AFE) with inhibited regenerative characteristics.
   b. 6-pulse VFDs:
      1) VFD input circuitry (each VFD) shall include series line reactors or DC chokes (3% to 5% nominal as recommended by the VFD Supplier) and 6 pulse rectifier circuitry, standard so that input voltage characteristics shall have total harmonic distortion (THD) through the twenty fifth (25th) harmonic of not more than 3% per IEEE Standard 519.
4. Provide local control devices as indicated on the Drawings.
5. Provide VFD output dV/dT filters as indicated on the Drawings.
6. Provide incoming harmonic filters as indicated on the Drawings.
7. Provide local disconnect switches with auxiliary contact as indicated on the Drawings.
8. It is the intent of this Specification that the project VFDs be provided with Type II-B wiring diagrams and fully integrated into the project control system by the Hardware System Integrator specified in Section 16921 - Control System Supplier.

1.02 QUALITY ASSURANCE

A. NEMA U.L. Listed

1. UL 508C Motor Drives
   a. Applies to drives designed prior to 2016 only
2. UL 61800-5-1 Adjustable Speed Electrical Power Drive Systems
3. UL 845 Electric Motor Control Centers

B. National Fire Protection Association (NFPA)

1. NFPA 70 National Electrical Code (NEC), current adopted Edition

C. National Electrical Manufacturer's Association (NEMA)

1. NEMA ICS 1 - General Standards for Industrial Control and Systems
2. NEMA ICS 2 - Industrial Control Devices, Controllers and Assemblies
3. NEMA 250 - Enclosures for Electrical Equipment
4. NEMA CP-1 - Capacitors

1.03 WORK FURNISHED AND INSTALLED BY OTHERS

A. All motors provided by other Specification Sections should meet the requirements of Section 16150 - Motors.

B. VFDs shall be integrated into the control system and provided with Type II-B control drawings by the Hardware System Integrator specified in 16921 - Control System Supplier.

1.04 SHOP DRAWINGS AND PRODUCT DATA

A. Submit in accordance with Section 01300 - Submittals. Clearly indicate VFD nameplate ratings, dimensions, schematic wiring diagrams, accessories.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's data in accordance with Section 01730 – Operation and Maintenance Data for operation and maintenance data for repairing, cleaning, testing requirements and parts list.

B. Include a VFD setting sheet that lists the final settings of each VFD as coordinated with the Contractor and the equipment supplier(s).

PART 2 PRODUCTS

2.01 VARIABLE FREQUENCY DRIVES

A. Variable frequency drive (VFD) unit shall be pulse width modulated (PWM) type incorporating volts per Hertz control. Unit shall bear the U.L. label. Refer to the Drawings for specific details.

B. Input characteristics and requirements:

1. 480 volt (nominal) +/- 10%, three phase, 60 Hz +/- 1.0 Hz.
2. Enclosure shall have main disconnecting means with external operating handle and padlock off provisions. Enclosure shall include a 480V:120V control power transformer (CPT) to convert the incoming 480 VAC line power to 120 VAC to power lights, controls, solenoids, etc. The VFD will not be supplied with an auxiliary or separate source of 120 VAC power.
3. Efficiency, 97.0% at full speed, input to output; input line pf, 0.95 minimum.
4. Drive shall automatically shut down on input power abnormalities and shall automatically restart upon restoration of "normal" power.
5. Incoming line surge protection, arresters, and surge capacitors, minimum.
6. Current limiting SCR fuses shall be applied where applicable or otherwise required by VFD manufacturer.
7. VFD input circuitry (each VFD) shall include series line reactors (3% to 5% nominal as recommended by the VFD Supplier) and 6 pulse rectifier circuitry, standard so that input voltage characteristics shall have total harmonic distortion (THD) through the twenty fifth (25th) harmonic of not more than 3% per IEEE Standard 519-1992.

C. Ambient conditions:

1. Temperature: 0-40°C.
2. Humidity: 5-95% non-condensing.

D. Output conditions:

1. 480 volt, 3 phase.
2. Operate 480 volt, nominal 3 phase, Design B, motor with NEMA Code G locked rotor characteristics. Size VFD for not less than motor nameplate fullload ampacity. Pay particular attention to the fullload amp ratings of Non-NEMA motors such as submersible pumps, etc.
3. Rated for 110% of drive amperage rating overload for one minute, minimum.
4. Variable Torque – Standard duty VFD applications such as centrifugal fans and pumps shall be provided with variable torque VFD ratings.
5. Constant Torque - Heavy duty VFD applications such as augers, rotary lobe pumps, mixers, etc shall be provided with constant torque VFD ratings. See the Drawings for additional information.
6. The Contractor shall be responsible for furnishing and installing all auxiliary equipment recommended by the drive manufacturer to prevent equipment damage and excessive noise. This auxiliary equipment shall include, but not be limited to, line reactors, shielded cable, motor terminators, dV/dT filters and increased cable insulation. Such devices shall reduce ripple in the rectifier output and reduce harmonic distortion

reflected into incoming power feeders to acceptable levels. These output series devices shall also protect the motor from damaging overvoltage resulting from reflected higher order frequencies.

7. General guidelines for VFD output accessory devices shall be as follows, based on motor lead lengths, but should be confirmed with the specific VFD manufacturer before implementation:
   a. Output Leads 50 Feet or Less: No output accessories required, unless recommended by the VFD supplier.
   b. Output Leads 50 to 150 Feet: Provide line reactor or motor attenuator as recommended by the VFD supplier. See the Drawings for additional requirements.
   c. Output Leads more than 150 Feet: Provide dV/dT filter, TCI, or equal.
8. Maximum peak voltage of PWM VFD output pulse of 1000 volts, with pulse rise time of not greater than 2 microseconds. Maximum frequency of PWM VFD output pulse (carrier) frequency of 3000 Hz. Should magnitudes of these characteristics be more stressful to motor insulation than specified values, furnish filter network on VFD output to protect motors.
   a. Coordinate with the VFD manufacturer, which devices are required and will be supplied based on estimated motor lead lengths from the drive to the motor and VFD manufacturer recommendations. The application of filtering equipment shall be designed and approved by VFD manufacturer and built into the VFD enclosure.
   b. As part of the shop drawing submittals, submit a VFD performance study for each VFD installation which provides documentation justifying the use of devices which show conformance to the VFD manufacturer's recommendations on motor lead lengths and other noise/motor damage prevention requirements. This study shall include anticipated peak voltage to the motor, anticipated pulse rise time, and the PWM output pulse frequency setting based on anticipated lead lengths from the drive to the motor for each installation.
   c. Reset PWM pulse output frequency from the factory default to the lowest possible setting (2000 to 3000 Hz), nominal. Confirm.
   d. Coordinate minimum equipment rotating speed, skip frequencies and ramp rates with the process and mechanical equipment suppliers, and program the VFD accordingly.

E. Features:

1. VFD's for installation within waste water facilities or lift stations, harsh environments, or areas exposed to chemical exposure shall have circuit boards conformally coated for increased corrosion resistance protection.
2. Front door mounted microprocessor based unit with digital programming panel. Panel shall have programming keys and alphanumeric display to allow operator to view and modify drive parameters, alarms, and operating conditions.
3. Programmable parameters:
    a. Acceleration time
    b. Deceleration time
    c. Frequency range
    d. Skip frequency ranges
    e. Number of restart attempts
4. Overload protection (Confirm fullload rating w/motor manufacturer and program VFD to limit speed such that motor is not overloaded.)
5. Programmable displays:
    a. Frequency
    b. Voltage
    c. Percent load
    d. Percent power
6. Protection features (with separate indications for each event):
    a. Undervoltage trip
    b. Overvoltage trip
    c. Drive overcurrent trip
    d. Drive overtemp trip
    e. Motor overcurrent trip
    f. Motor overtemp trip (monitor normally closed thermal switch in motor)
    g. Output ground fault trip

F. Front Panel Components and Control Configuration:

1. Six digit, non-resettable running time meter. Record running time in hours and tenths.
2. Speed potentiometer shall be used to control the speed of the drive while the selector switch is in "Hand".
3. Front panel selector switch shall have the following functions:
    a. "Hand" (Speed Select 1) - Start up and run based on the speed potentiometer.
    b. "Off" - Drive does not operate under any condition.
    c. "Auto" (Speed Select 2) - Drive runs when remote “required” contacts are closed. Drive speed shall be based on a 4-20 mA speed signal from the PLC.
4. Generate 4-20 mAdc isolated signal proportional with drive speed from 0 to 100%.

5. Lockout/Disable - Where shown, prevent drive operation when remote contacts such as “motor overtemperature” or “local disconnect switch open” are open.
6. Auxiliary Contacts - Provide isolated SPDT contacts for remote monitoring as indicated on the Drawings. Provide interposing relays within the VFD enclosure to provide the contacts as required. Contacts typically include, but are not limited to the following:
    a. “Running” (two sets of SPDT contacts)
    b. “Alarm/Fault” (any alarm condition)
    c. “Motor Disabled (local disc sw open)”
    d. “Motor Overtemp”
    e. “HOA in AUTO Position”
    f. Additional contacts as indicated on the Drawings.
7. Provide additional internal components, relay logic, front panel components, interfaces to field devices, and input/output signals as shown on Drawings and as described in the functional descriptions in this Section.
8. Ramp Up / Ramp Down Settings
    a. Coordinate, confirm, and document all VFD settings including, but not limited to, ramp rate, minimum speed, and maximum speed with the process equipment supplier during startup. Field test and adjust all settings in cooperation with the process equipment supplier.
    b. It is anticipated that each VFD will be set to ramp up to a pre-determined speed set at the VFD over an adjustable time period (20 seconds nominal - confirm).
    c. It is anticipated that each VFD will ramp down upon stop command over an adjustable time period (20 seconds nominal - confirm). On pumps, the VFD should stop at approximately the same time that the pump check valve closes - if applicable. Adjust this feature to approximate time required to minimize water hammer.
    d. Coordinate exact requirements with individual equipment suppliers and program specialty ramps (such as dual slope ramps to submersible well motors to protect the Kingsbury bearings) as required to maintain equipment warranty.
9. Ethernet I/P Control Module - Able to see and modify drive parameters as listed on the drawings over the Ethernet I/P network via the manufacturers Ethernet I/P communications card.
10. All control devices including, but not limited to, selector switches, pushbutton switches, limit switches and indicating lights shall be of the 30mm heavy duty, oil tight type. The contacts shall meet NEMA rating designation A600. All time clocks, timers, switches, relays, etc., shall be permanently labeled.

11. Front Panel Push-to-Test Indicating Lights – Provide push-to-test indicating lights with LED lamps as follows:
    a. Green - "Running"
    b. Red - "Alarm/Fault"
    c. Amber - "High Temp" (Motor Thermal)
    d. Red - "Disconnect Open"

G. Enclosure

1. Drive and all line reactors, filters and accessory equipment shall be installed within the confines of a standalone NEMA 1 ventilated VFD enclosure as indicated on the “E” drawings. Provide removable mesh foil filters on all VFD ventilation openings.

H. Schedule of Equipment

1. 6 pulse rectifier with input line reactor
    a. As shown on the “E” drawings.

I. Manufacturer/Model

All project drives furnished shall be provided from the same manufacturer

1. AllenBradley Powerflex
2. Square D equivalent
3. Cutler Hammer equivalent
4. ABB
5. Or prior approved equivalent.

2.02 INCOMING HARMONIC FILTERS

A. The harmonic filter shall treat all characteristic low frequency harmonics generator by a 3 phase full wave converter load (5th, 7th, 11th, 13th, etc.)

B. The harmonic filter shall be a passive series connected low pass filter consisting of an inductor capacitor network.

C. The harmonic filter shall be capable of feeding a rectifier composed of diodes, thyristors, or any combination thereof.

D. The harmonic filter shall meet the harmonic performance specifications with a 3% phase voltage unbalance as defined by ANSI C-84.1-1995.

E. The filter shall be UL-508 Listed.

F. The harmonic filter in combination with the variable frequency drive shall meet the requirements of IEEE 519.

G. The harmonic filter shall be configured such that it contains an isolation contactor which will automatically isolate the harmonic filter's power factor correction capacitors.

H. Harmonic filter capacitor bank shall be pulled in via drive relay output contact on the VFD.

I. Manufacturer/Model:

1. MTE Matrix AP Series
2. TCI Equal
3. Or prior approved equivalent

2.03 CONTROL DEVICES

A. Where required the Contractor shall supply all control devices including, but not limited to, selector switches, push button switches, limit switches, and indicating lights. All control devices shall be of the heavy duty, oil tight type. The contacts shall meet NEMA rating designation A600. Each control device shall be supplied complete with escutcheon and nameplate. Each control device shall have its function permanently marked on the escutcheon. Raised letters on plastic adhesive tape is not acceptable.

B. Furnish and install engraved plastic type label designating equipment served. Embossed raised letter type labels shall not be acceptable. Letters shall be ¼" high and white in color on a black background.

C. Control Power Transformers (CPT) are to be installed within VFD enclosures as shown on drawings for use with control devices and accessories. CPT's are to be sized with 25% spare capacity minimum and provided with primary and secondary fused protection.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide all VFDs with variable torque or constant torque ratings as required for the driven equipment, continuous full load ampere ratings and overload settings equal to or greater than the nameplate rating on the installed motor.

B. Utilize liquid tight conduit connections to motor as noted in Section 16210 - Conduit.

C. Provide variable frequency drives in enclosures and quantities shown on the “E” Drawings.

D. The Contractor (in conjunction with the process or mechanical equipment supplier and the VFD supplier) shall fully test and adjust the variable frequency drive to allow control of each system to maximum efficiency, including lockout frequencies. The final arrived at settings for each VFD system shall be submitted to the Engineer and included in the O&M manuals.

3.02 FACTORY TESTING

A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

1. All printed circuit boards shall be functionally tested via automatic test equipment prior to unit installation.

B. The manufacturer shall provide three (3) certified copies of complete VFD final test reports.

3.03 TRAINING

A. Training on the project VFD's shall be for eight (8) hours, minimum on site. The training sessions shall consist of two (2) separate, four (4) hour sessions at Site. The Owner may record the training sessions.

B. All training sessions shall be at times that are prior approved with the Owner. Two week prior approval of all training sessions is required.

3.04 SUPPLIES

A. At Final Completion, Contractor shall furnish the following expendable items:

1. Twenty (20) percent spare fuses and lamps of each type furnished under this Section, but not less than two (2) of each type.
2. The following spare parts shall be provided:
   a. Main Control Board - One (1) per VFD Frame size on the project to which they are compatible with.
   b. HIM - One (1) of each type provided on the project
   c. Communication Card - One (1) per VFD Frame size to which they are compatible with.
   d. Fans - One (1) per VFD Frame size provided on the project to which they are compatible with.
   e. I/O Cards - One (1) of each type provided on the project.

END OF SECTION

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SECTION 16921 - CONTROL SYSTEM SUPPLIER

PART 1 - GENERAL

1.1. SUMMARY

A. NOTE, THE CONTROL SYSTEM MANUFACTURER AS SPECIFIED HEREIN SHALL PROVIDE THE CONTROL SYSTEM AND INSTRUMENTATION LISTED

1. Description
   a. Complete PLC based control system with Supervisory Control and Data Acquisition (SCADA) functions.
2. Responsibility and Coordination
   a. It shall be the responsibility of the Contractor to provide a complete, fully operating and acceptable system. Drawings and Specification are intended to describe a complete installation for the purpose specified and to detail the scope of work for the Contractor.
   b. The Contractor shall be responsible for all details that may be necessary to properly provide, and place in operation, the complete installation. The Contractor shall assume full responsibility for additional costs that may result from unauthorized deviations from the project documents or those items found necessary to install to make the pump station and its systems fully functional to the satisfaction of the owner and equipment suppliers.
3. Work Items Specified Under This Section
   a. Control System Manufacturer Requirements.
   b. Instrumentation
4. CONTROL SYSTEM MANUFACTURERS
   a. This project requires the services of a prequalified control systems manufacturer.
      1) Acceptable Control System Manufacturers are:
         (a) Integrated Process Solutions
            (1) Location: Fosston, MN
            (2) Phone: (218) 435-1703
         (b) Wunderlich-Malec
            (1) Location: Minnetonka, MN
            (2) Phone: (952) 933-3222
         (c) Primex
            (1) Location: Plymouth, MN
            (2) Phone: (763) 559-0568
         (d) Or “Approved Equal”

PART 2 - PRODUCTS

2.1. GENERAL

A. The Systems Integrator (SI) shall provide a fully-functioning control panel and associated instrumentation that can integrate into Williston WRRF's SCADA system utilizing a cellular radio network as indicated on the drawings.

2.2. PROCESS CONTROL PANEL

A. The SI shall provide a control panel with the following characteristics:

1. Enclosure with back panel and mounting provisions not to exceed the size of 36"W by 16"D by 42"H
2. All required components necessary for a fully functional control panel.
3. Capable of being powered from qty. two (2) 20A, 120V/1P breakers.
4. Controls System
    1) Managed Ethernet Switch
        (a) Manufacturer/Model
            (1) Stratix 5200
            (2) Prior Approved Equal
    2) Operator Interface Terminal
        (a) Manufacturer/Model
            (1) Allen Bradley PVP7 Standard 10"
            (2) Prior Approved Equal
    3) Cellular Radio
        (a) Manufacturer/Model
            (1) Cradlepoint S750 TB05-0750C4D-NN
            (2) No exceptions
    4) Cellular Antenna
        (a) Manufacturer/Model
            (1) SureCall SC-588W
            (2) No exceptions
5. See "E" drawings for additional panel mounted equipment.

2.3. INSTRUMENTATION

1. All instrumentation noted on drawings and below shall be furnished by the SI and installed by the prefabricated pump station supplier. Refer to Division 2 for additional information. Below are the instruments that will be furnished through the SI's scope and installed by the prefabricated pump station supplier.
    a. Pressure Transducer
        1) Schedule: As indicated on "E" drawings.
            (a) Manufacturer/Model
                (1) Rosemount 2088G
                (2) E+H Cerabar S PMP71
                (3) Prior Approved Equal

(b) General Specifications
(1) Pressure Transducer to be supplied with manufacturer's specific manifold.

b. Flood Switch
1) Schedule: As indicated on "E" drawings.
(a) Manufacturer/Model
(1) Gem Sensors LS-270 series
(2) Prior Approved Equal

c. Ambient Air Temperature Sensor
1) Schedule: As indicated on "E" drawings.
(a) Manufacturer/Model
(1) Omega EWSA-PT100-TX
(2) E+H TST434
(3) Prior Approved Equal

d. Magnetic Door Intrusion Switch
1) Schedule: As indicated on "E" drawings.
(a) Manufacturer/Model
(1) Sentrol Industrial 151 GuardSwitch
(2) Prior Approved Equal

e. Flowmeter
1) The magnetic flowmeter and wall mount transmitter furnished shall be the same manufacturer/model as the magnetic flowmeter systems provided for the Williston WRRF.
2) Flowmeter system shall be supplied with the manufacturer's cabling system.
3) Schedule: As indicated on "E" drawings.
(a) Manufacturer/Model
(1) Rosemount
(2) Prior Approved Equal

2. The prefabricated pump station supplier shall be responsible for the following:
a. Installation of the control panel, pressure transducers, magnetic flowmeter system and any associated instrumentation.
b. All associated circuitry (cable and conduit) for the equipment listed above and as indicated on the drawings.

PART 3 - EXECUTION

3.1. INSTALLATION/WORKMANSHIP

A. The workmanship and design of this equipment shall conform to all national, state and local electrical codes and ordinances that apply. The control system manufacturer shall provide complete electrical schematic wiring (factory and field) diagrams showing all components together with a description of system operation. Complete information to adjust and service this equipment shall be included.

B. Wire Labels: All wires, both those factory terminated by the Control System Manufacturer as well as field wiring terminated by the Electrical Contractor to the Control Panel shall be provided with printable heat shrink labels installed on the wire prior to termination. All markers shall be positioned such that they can be clearly read by anyone looking at them without having to adjust the wire positioning.

C. Installation, calibration, testing and initial startup of telemetry equipment stated herein shall be provided by AE2S. Antenna shall be delivered to the following location:

1. Advanced Engineering & Environmental Services, LLC
   a. ATTN: I&C Department
   b. 1102 Main Street, Williston, ND 58801

D. AE2S shall field install the configured antenna utilizing the systems integrators supplied space/junction box and mounting equipment.

3.2. PREFABRICATED PUMP STATION MANUFACTURER SERVICES

A. The contractor shall make all required coordination efforts with the SI necessary to schedule and complete the installation of the controls and instrumentation prior to delivery of the booster station.

B. All panels and instrumentation that are furnished by the SI shall be shipped to the prefabricated pump station manufacturer facility for complete installation and circuiting of equipment provided.

3.3. CONTROL SYSTEM MANUFACTURER SERVICES

A. The services of a factory trained, qualified service representative that is part of the permanent staff of the control system manufacturer shall be provided to inspect the complete equipment installation to insure that it is installed in accordance with the manufacturer's recommendations and for commissioning the project.

B. Provide final calibration of all instrumentation before shipping. Provide coordination necessary for the correction of interface deficiencies between instrumentation, control panels, control equipment, and final control devices. Provide written documentation on the problems found detailing device names and tags, tests conducted, diagnosis, and corrective action to be taken.

C. Verify that each instrumentation and control device is wired and operating correctly by going "online" with each PLC, testing each field device, and witnessing correct action in the PLC through the programming software.

END OF SECTION

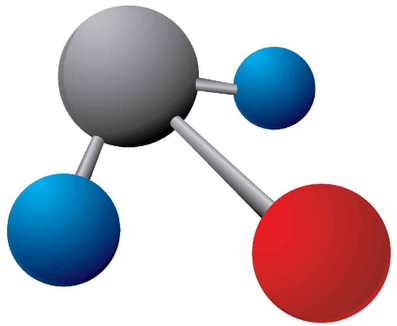
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WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

PUMP STATION

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively





PREPARED FOR:

City of Williston

LOCATION:

Williston, ND

DATE:

February 2026

AE2S PROJECT NO:

P00581-2025-003

ENGINEERING TEAM:

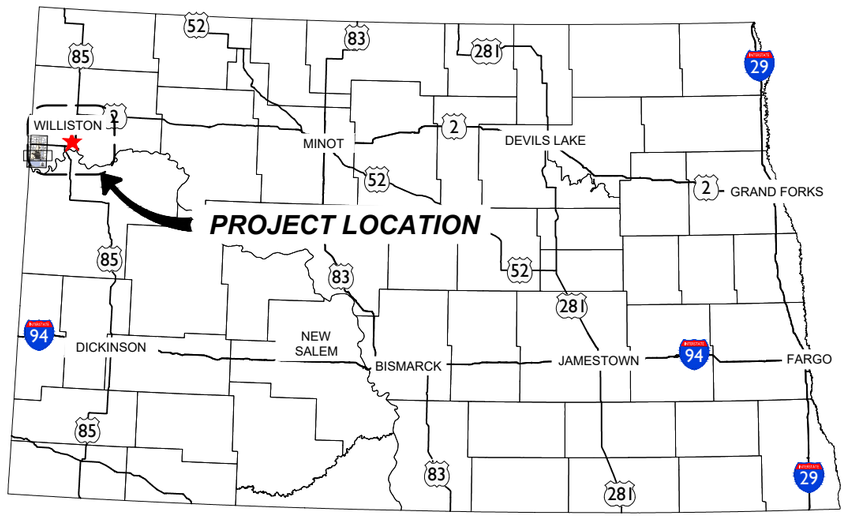
CIVIL ENGINEER
Advanced Engineering and Environmental Services, LLC

PROCESS ENGINEER
Advanced Engineering and Environmental Services, LLC

ELECTRICAL ENGINEER
Advanced Engineering and Environmental Services, LLC

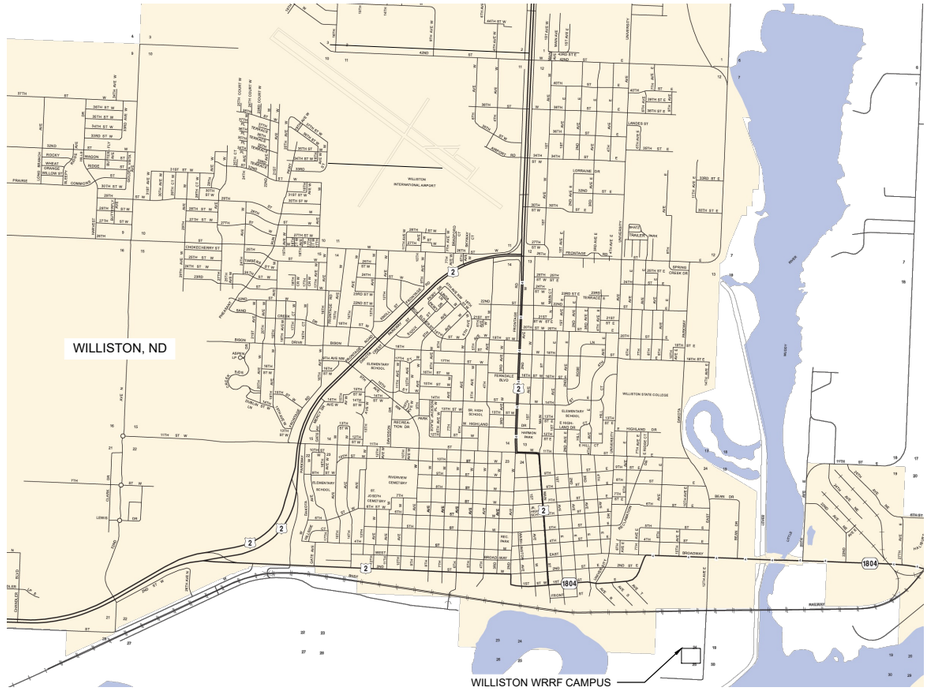
Plotted By: Richard Marohl Date: Tuesday, February 24, 2026

Advanced Engineering and Environmental Services, LLC www.ae2s.com



1 G002 **PROJECT LOCATION MAP**
Williams County

NORTH



2 G002 **PROJECT VICINITY MAP**
Williams County

NORTH



3 G002 **PROJECT AERIAL MAP**
Williams County

NORTH

AE2S

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
KEVIN JOHNSON
PE-4964
02-20-2026
Date
NORTH DAKOTA

STATUS: **PRELIMINARY - NOT FOR CONSTRUCTION**

SYM	DATE	APPR

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
LOCATION MAP

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: RFM
CHECKED BY: KMJ
APPROVED BY: KMJ

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **G002**

File: C:\Users\RMarohl\ADCVACDocs\AE2S\00581-2025-003 Williston WRRF Water Reuse - Muni Golf\Project Files\00 General\Plan Sheets\GIS Location Map-Pump Station.dwg
Plotted By: Richard Marohl Date: Tuesday, February 24, 2026

File: C:\Users\RMarolf\DC\ACCDocs\AE2S\00581-2025-003 Williston WRRF Water Reuse - Muni Golf\Project Files\00-General\Plan Sheets\GS-Drafting Convention-Pump Station.dwg
Plotted By: Richard Marolf Date: Wednesday, February 25, 2026

SHEET NUMBERING

SHEET SERIES	SERIES DESCRIPTION
000	SYMBOLS LEGEND, DRAFTING CONVENTIONS, NOTES, ETC.
100	PLAN VIEWS AND COMBINATION PLAN & PROFILE VIEW (HORIZONTAL VIEWS)
200	ELEVATIONS AND PROFILES (VERTICAL VIEWS)
300	SECTIONS (SECTION VIEWS, WALL SECTIONS)
400	LARGE SCALE VIEWS (SCALED UP REPRODUCTIONS OF PLANS, ELEVATIONS OR SECTIONS NOT IN DETAILS
500	DETAILS
600	SCHEDULES AND DIAGRAMS
700	

DRAWING INDEX

SHEET	DESCRIPTION
G001	COVER SHEET
G002	LOCATION MAP
G003	SHEET INDEX AND ABBREVIATIONS
G004	LEGEND
C001	PUMP STATION SITE PLAN
C301	PUMP STATION PLAN AND PROFILE
P001	PUMP STATION PLAN AND SECTION
P002	PUMP STATION SECTION
P003	PUMP STATION PLAN AND SECTION
P004	PUMP STATION SECTION VIEW
E001	PUMP STATION CONCRETE SLAB
E101	PUMP STATION ELECTRICAL SITE PLAN
E102	PUMP STATION ELECTRICAL FLOOR PLAN
E103	PUMP STATION ELECTRICAL SECTION
E601	PUMP STATION ONE-LINE DIAGRAM
E602	CONTROL PANEL LAYOUT
E603	PLC IO SCHEDULR
E604	TYPICAL WIRING DIAGRAMS
E605	VFD WIRING SCEMATIC
E606	VFD WIRING SCEMATIC
E701	VARIOUS DETAILS
E702	VARIOUS DETAILS
E801	CABLE AND CONDUIT SCHEDULE

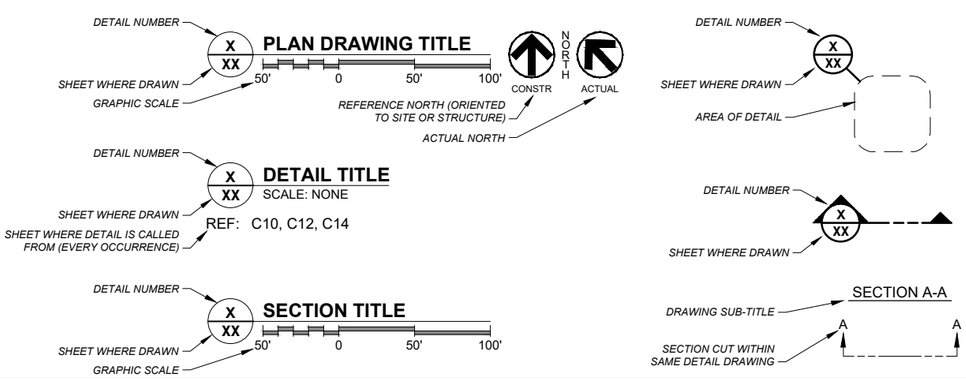
CIVIL ABBREVIATIONS

&	- AND	DWG.	- DRAWING	PC	- POINT OF CURVATURE
∠	- ANGLE	E.	- EAST	PC	- PRECAST
@	- AT	E-W	- EAST TO WEST	P.C.C.	- PORTLAND CEMENT CONCRETE
℄	- CENTERLINE	EA.	- EACH	PE	- POLYETHYLENE
°	- DEGREES	E.F.	- EACH FACE	PE or P.E.	- PLAIN END
Δ	- DELTA	EJ	- EXPANSION JOINT	PEP	- POLYETHYLENE PIPE
Ø	- DIAMETER	ELEC.	- ELECTRICAL	PI	- POINT OF INTERSECTION
□	- SQUARE	ELEV.	- ELEVATION	PO	- PUSH ON
±	- PLUS / MINUS	EP	- END OF PROJECT	POLY	
ABS	- ACRYLONITRILE-BUTADIENE-STYRENE	EQ.	- EQUAL	PRV	- PRESSURE REDUCING VALVE
ACI	- AMERICAN CONCRETE INSTITUTE	EVC	- END VERTICAL CURVE	PSI	- POUNDS PER SQUARE INCH
ACP	- ASBESTOS CEMENT PIPE	E.W.	- EACH WAY	PT	- POINT OF TANGENCY
ADD'L	- ADDITIONAL	EXIST.	- EXISTING	PLV	- PLUG VALVE
ADDM.	- ADDENDUM	EXP.	- EXPANSION	PVC	- POLYVINYL CHLORIDE
ADJ.	- ADJUSTABLE	FDN.	- FOUNDATION	PVI	- POINT OF VERTICAL INTERSECTION
AGGR.	- AGGREGATE	FIN.	- FINISH	R or RAD	- RADIUS
ALT.	- ALTERNATE	FL	- FLOW LINE OR FLANGE	R.	- RISER
APPR.	- APPROACH	FLR.	- FLOOR	RCCP	- REINFORCED CONCRETE CYLINDER PIPE
APPROX.	- APPROXIMATE	FM	- FORCE MAIN	RCP	- REINFORCED CONCRETE PIPE
APPURT.	- APPURTENANCE	FRP	- FIBERGLASS REINFORCED PLASTIC	RDL	- ROOF DRAIN LINE
ARCH.	- ARCHITECT or ARCHITECTURAL	FT.	- FOOT	RES	- RESERVOIR
AR MH	- AIR RELEASE MANHOLE	G&S	- GROOVE AND SHOULDER	REQ'D.	- REQUIRED
ARV	- AIR RELEASE VALVE	GA.	- GAGE	REQ'MTS.	- REQUIREMENTS
ASSY.	- ASSEMBLY	GALV.	- GALVANIZED	RJ	- RESTRAINED JOINT
ASTM	- AMERICAN SOCIETY FOR TESTING MATERIALS	GR.	- GRADE	S.	- SOUTH
AVE	- AVENUE	GRD.	- GROUND	S-N	- SOUTH TO NORTH
AVV	- AIR / VACUUM VALVE	GV	- GATE VALVE	SAN	- SANITARY
BFV	- BUTTERFLY VALVE	H	- HATCH	SCH.	- SCHEDULE
BITUM.	- BITUMINOUS	HDD	- HORIZONTAL DIRECTIONAL DRILLING	SD	- STORM DRAIN
BL	- BUILDING LINE	HDPE	- HIGH DENSITY POLYETHYLENE	SECT.	- SECTION
BLDG.	- BUILDING	HORZ.	- HORIZONTAL	SF	- SQUARE FEET
BLK.	- BLOCK	HR.	- HANDRAIL	SIM.	- SIMILAR
B.O.	- BY OTHERS	HT.	- HEIGHT	SS	- SANITARY SEWER
BP	- BEGINNING OF PROJECT	HYD	- HYDRANT	SSSL	- SANITARY SEWER SERVICE LEAD
BRG.	- BEARING	I.D.	- INSIDE DIAMETER	ST	- STREET
BSMT.	- BASEMENT	I.E.	- INVERT ELEVATION	STA	- STATION
BVC	- BEGIN VERTICAL CURVE	IN.	- INCH	STD.	- STANDARD
C-C	- CENTER TO CENTER	INSUL	- INSULATION	STL.	- STEEL
C&G	- CURB AND GUTTER	INV.	- INVERT	STN. STL.	- STAINLESS STEEL
CB	- CATCH BASIN	JT.	- JOINT	STR.	- STRUCTURAL
CDF	- CONTROLLED DENSITY FILL	K	- RATE OF CURVATURE	STRUCT	- STRUCTURAL
CF	- CUBIC FEET	L	- LENGTH OF CURVE	SUP.	- SUPPORT
CI	- CAST IRON	LB	- POUND	SWPP	- STORM WATER POLLUTION PROTECTION
CIP	- CAST IRON PIPE	LCCP	- LINED CONCRETE CYLINDER PIPE	SY	- SQUARE YARD
C.I.P.	- CAST IN PLACE	LF	- LINEAR FEET	TEMP.	- TEMPORARY
CJ	- CONSTRUCTION JOINT	LVC	- LENGTH OF VERTICAL CURVE	THK.	- THICK
CL	- CENTERLINE	LVL	- LEVEL	TOC	- TOP OF CASTING
CMP	- CORRUGATED METAL PIPE	MAX.	- MAXIMUM	T.O.P.	- TOP OF PIPE
CO	- CLEANOUT	MECH	- MECHANICAL	TOS	- TOP OF STEEL
CONC.	- CONCRETE	MFG.	- MANUFACTURER	TYP.	- TYPICAL
CONSTR.	- CONSTRUCTION	MH	- MANHOLE	UON	- UNLESS OTHERWISE NOTED
CONT.	- CONTINUOUS	MJ or M.J.	- MECHANICAL JOINT	USACE	- U.S. ARMY CORPS OF ENGINEERS
CNTRL.	- CONTROL	MIN.	- MINIMUM	VCP	- VITRIFIED CLAY PIPE
CSP	- CORRUGATED STEEL PIPE	MNDOT	- MINNESOTA DEPARTMENT OF TRANSPORTATION	VERT.	- VERTICAL
CSV	- CURB STOP VALVE	MTDOT	- MONTANA DEPARTMENT OF TRANSPORTATION	W.	- WEST
CTR	- CENTER	MTR.	- METER	W-E	- WEST TO EAST
CU	- COPPER	N.	- NORTH	W/	- WITH
CY	- CUBIC YARD	N-S	- NORTH TO SOUTH	W/O	- WITHOUT
DEPR.	- DEPRESSION	NA	- NOT APPLICABLE	WM	- WATERMAIN
DTL	- DETAIL	NDDOT	- NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	WRF	- WATER RECLAMATION FACILITY
DI or D.I.	- DUCTILE IRON	NPT	- NIPPLE	WSL	- WATER SERVICE LEAD
DIA.	- DIAMETER	NTS	- NOT TO SCALE	WTF	- WATER TREATMENT FACILITY
DIM.	- DIMENSION	O.C.	- ON CENTER	WTP	- WATER TREATMENT PLANT
DIP	- DUCTILE IRON PIPE	O.D.	- OUTSIDE DIAMETER	WWF	- WELDED WIRE FABRIC
DIST.	- DISTANCE	OH.	- OVERHEAD	WWTP	- WASTE WATER TREATMENT PLANT
DR	- DRIVE	OPNG.	- OPENING		
DRWY	- DRIVEWAY	OSHA	- OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION		

SHEET DESIGNATORS

SHEET DESIGNATOR	DESCRIPTION	SHEET DESIGNATOR	DESCRIPTION	SHEET DESIGNATOR	DESCRIPTION
GEN	GENERAL SHEETS				
SW	SITE WORK				
SD	STANDARD DETAILS				

DRAWING, SECTION AND DETAIL CONVENTIONS



Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
KEVIN JOHNSON
PE-4964
02-20-2026
Date
NORTH DAKOTA

STATUS: PRELIMINARY - NOT FOR CONSTRUCTION

SYM	DATE	APPR

GENERAL NOTES

1. THE INFORMATION DEPICTED WITHIN THESE DRAWINGS IS COMPILED FROM LEGACY DRAWINGS AND FIELD SURVEYS FROM PREVIOUS PROJECTS, SITE VISITS, CONSTRUCTION OBSERVATION TIES AND PHOTOGRAPHS, AND THE MEMORIES OF CITY STAFF AND CONSTRUCTION OBSERVERS.
2. THE LOCATIONS OF KNOWN UNDERGROUND UTILITIES ARE SHOWN ON THE CONSTRUCTION DRAWINGS IN AN APPROXIMATE WAY ONLY. ADDITIONAL ACTIVE AND INACTIVE UTILITIES MAY BE PRESENT.
3. COORDINATE ALL ON-SITE STAGING WITH OWNER TO AVOID CONFLICTS WITH EXISTING UTILITIES.
4. MAINTAIN OWNER ACCESS TO SITE AT ALL TIMES.

CIVIL DRAWING SYMBOLS

100'-0"± FLOOR	EXISTING ELEVATION IN SECTION VIEW (CONTRACTOR TO VERIFY)
100'-0"± FLOOR	EXISTING ELEVATION IN PLAN VIEW (CONTRACTOR TO VERIFY)
108'-0" WALL	DESIGN ELEVATION IN SECTION VIEW
108'-0" FLOOR	DESIGN ELEVATION IN PLAN VIEW
	BREAKLINE
	DIRECTION OF FLOW
1	EXISTING NOTES
1	DEMOLITION NOTES
1	CONSTRUCTION NOTES
1	PIPING SCHEDULE ITEMS
EQUIP	EQUIPMENT SCHEDULE ITEMS

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT
Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
SHEET INDEX AND ABBREVIATIONS

CLIENT: CITY OF WILLISTON, WILLISTON, ND

PREPARED BY: RFM
CHECKED BY: KMJ
APPROVED BY: KMJ

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: G003

File: C:\Users\RMarois\ND\ACCDocs\AE2S\00581-2025-003 Williston WRRF Water Reuse - Muni Golf\Project Files\00-General\Plan Sheets\GIS Symbols-Pump Station.dwg
Plotted By: Richard Marois Date: Tuesday, February 24, 2026

WATER

DESCRIPTION	EXISTING	NEW
PIPE		
WATER MAIN	W	
WATER SERVICE		
STRUCTURES		
MANHOLE	W	W
METER MANHOLE	M	M
ARV MANHOLE		
WELL	WW	WW
MONITORING WELL	MW	MW
PRV MANHOLE		
WATER HANDHOLE	W	W
VAULT	W	W
VALVES		
CURBSTOP		
GATE		
BUTTERFLY		
PLUG		
CHECK		
BALL		
HYDRANTS		
FIRE		
ARV		
BLOW OFF		
FITTINGS		
11.25° BEND		
22.50° BEND		
30° BEND		
45° BEND		
60° BEND		
90° BEND		
WYE (R)		
WYE (L)		
CAP		
COUPLING		
CROSS		
PLUG		
REDUCER		
TEE		
SADDLE TAP		

SANITARY

DESCRIPTION	EXISTING	NEW
PIPE		
SANITARY MAIN	SS	
SANITARY SERVICE		
STRUCTURES		
MANHOLE	S	S
CLEAN OUT	CO	CO
METER MANHOLE	M	M
SEPTIC TANK	ST	ST
VAULT	S	S
LIFTSTATION	L	L
VALVES		
GATE		
BUTTERFLY		
PLUG		
FITTINGS		
WYE (R)		
WYE (L)		
PLUG		
CAP		

STORM

DESCRIPTION	EXISTING	NEW
PIPE		
STORM MAIN	SD	
STORM LEAD		
STRUCTURES		
MANHOLE	D	D
AREA INLET		
BEEHIVE INLET		
CURB INLET		
DOUBLE CURB INLET		
OUTFALL		

GAS

DESCRIPTION	EXISTING	NEW
LINES		
NATURAL GAS	G	G
STRUCTURES		
MANHOLE	G	G
METER	G	G
VALVES		
GATE VALVE		

SITE

DESCRIPTION	EXISTING	NEW
VEGETATION		
CONIFEROUS TREE (LARGE)		
CONIFEROUS TREE (SMALL)		
DECIDUOUS TREE (LARGE)		
DECIDUOUS TREE (SMALL)		
SHRUB		
STUMP		
TREE LINE		
SIGNAGE		
STREET SIGN		
MILE POST	MP	MP
SITE		
BUILDING		
CURB		
CONCRETE		
FENCES		
BARBED WIRE		
CHAIN LINK		
WOOD		
VINYL		
WOVEN WIRE		
GUARD RAIL		
SILT	SF	SF
SUPER SILT	SSF	SSF
GATE POST	GP	
TOPOLOGY		
CONTOURS	900	900

ELECTRICAL

DESCRIPTION	EXISTING	NEW
LINES		
ELECTRIC	E	E
OVERHEAD	OHE	OHE
UNDERGROUND	UGE	UGE
STRUCTURES		
MANHOLE	E	E
HANDHOLE	E	E
UTILITY POLE		
GUY ANCHOR		
LIGHT POST		
PUSH TO WALK POST	P	P
STREET LIGHT		
SIGNAL		
SIGNAL WITH ARM		

COMMUNICATIONS

DESCRIPTION	EXISTING	NEW
LINES		
COMMUNICATIONS	C	
FIBER OPTIC	FO	
TELEPHONE	T	
CABLE TV	CATV	
CLOSED CIRCUIT TV	CCTV	
STRUCTURES		
MANHOLE	C	C
TELEPHONE MANHOLE	T	T
TELEPHONE PEDESTAL	T	T
TELEPHONE FIBER OPTIC PEDESTAL	FO	FO
TELEVISION PEDESTAL	TV	TV
UNKNOWN PEDESTAL	U	U

DEMOLITION

DESCRIPTION	EXISTING	NEW
LINES		
FEATURES TO BE REMOVED		
FEATURES TO BE ABANDONED		
REMOVE CURB & GUTTER		
STRUCTURES		
REMOVE TREE OR SHRUB		
AREA		
ITEMS TO BE REMOVED		

AE2S

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
KEVIN JOHNSON
PE-4964
02-20-2026
Date
NORTH DAKOTA

STATUS: PRELIMINARY - NOT FOR CONSTRUCTION

APPR	SYM	DATE

GENERAL NOTES

1. THIS LEGEND SHEET IS FOR VISUAL REFERENCE OF THE SYMBOLS AND LINETYPES USED ON THIS PROJECT. SOME OF THE SYMBOLS AND LINETYPES MAY NOT BE USED BY THIS PARTICULAR PROJECT.

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

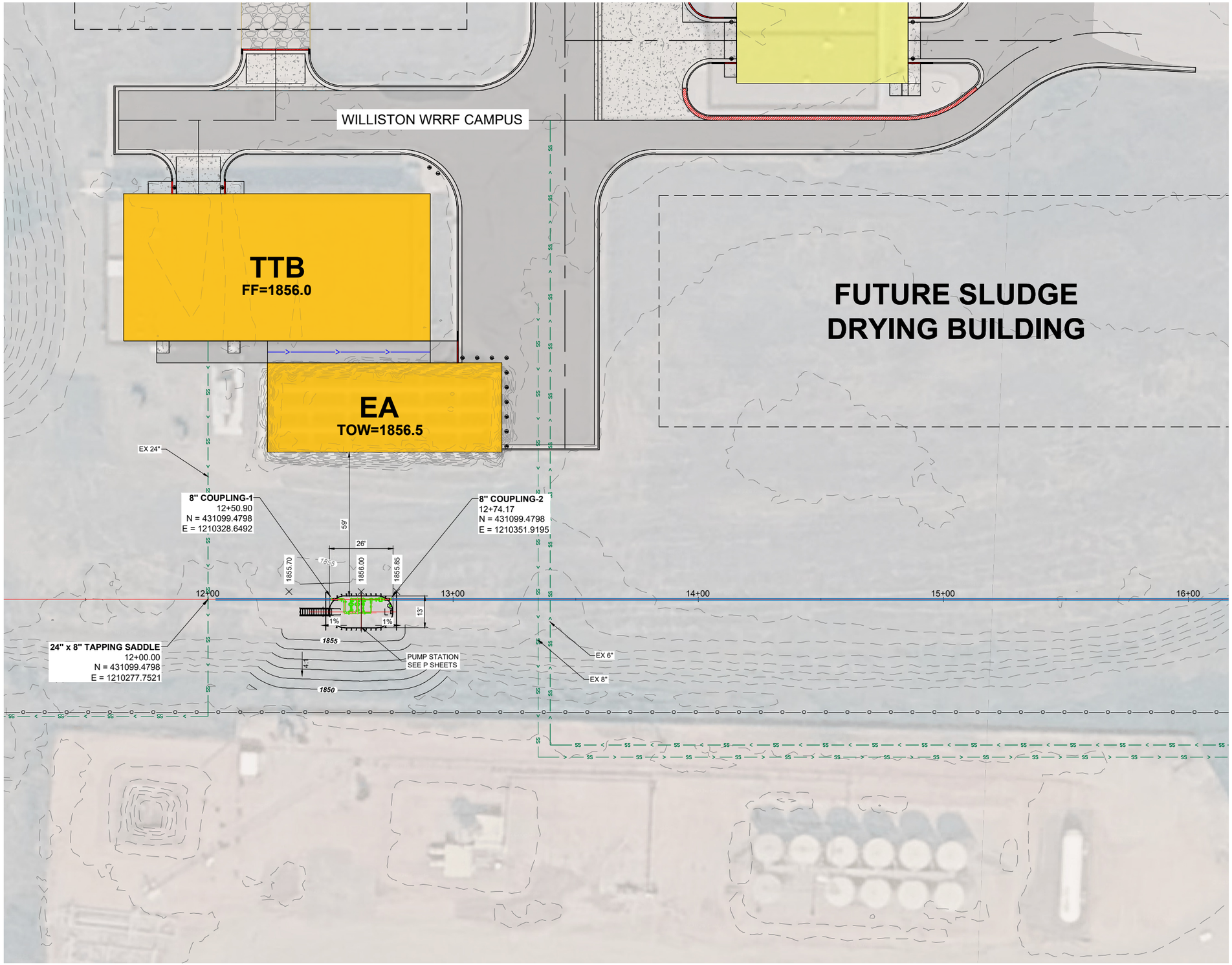
SHEET TITLE:
LEGEND

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: RFM
CHECKED BY: KMJ
APPROVED BY: KMJ

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **G004**

File: C:\Users\RMarohl\DOCACO2\cad\AE2S\00581-2025-003 Williston WRRF Water Reuse - Maxi Golf\Project Files\01-Civil\Plan Sheets\xC3-Pump Station.dwg



Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
KEVIN JOHNSON
PE-4964
02-20-2026
Date
NORTH DAKOTA

STATUS: PRELIMINARY - NOT FOR CONSTRUCTION

SYM	DATE	APPR

NORTH

0 20
Scale in Feet

GENERAL NOTES

1. CIVIL SITE WORK AND SITE PIPING ARE SHOWN FOR REFERENCE ONLY AND SHALL BE COMPLETED UNDER A SEPARATE CONTRACT. THIS CONTRACT PERTAINS TO THE PRE-PROCUREMENT OF THE PREFABRICATED PUMP STATION AND ALL CONTENTS THEREIN AS INDICATED ON THE PROCESS DRAWINGS AND AS INDICATED IN THE SPECIFICATIONS. INSTALLATION OF THE PREFABRICATED PUMP STATION SHALL BE COMPLETED UNDER A SEPARATE CONTRACT.

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

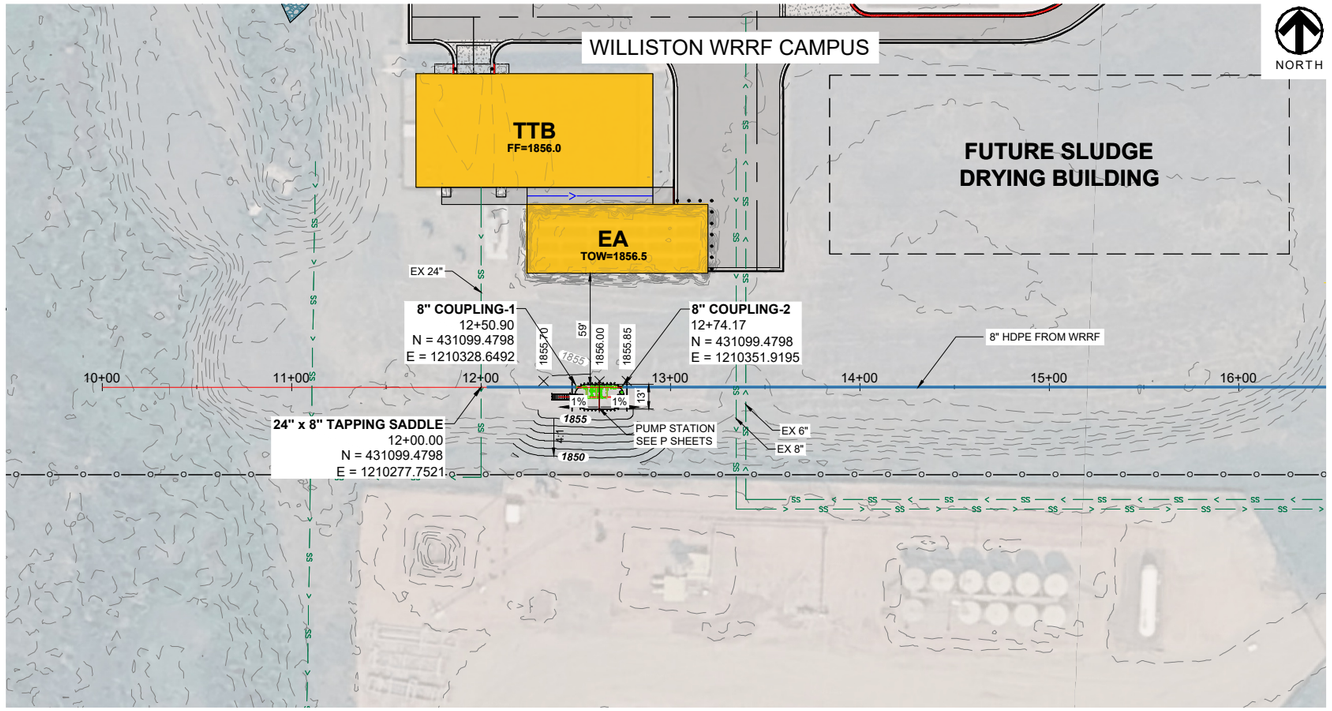
SHEET TITLE:
PUMP STATION SITE PLAN

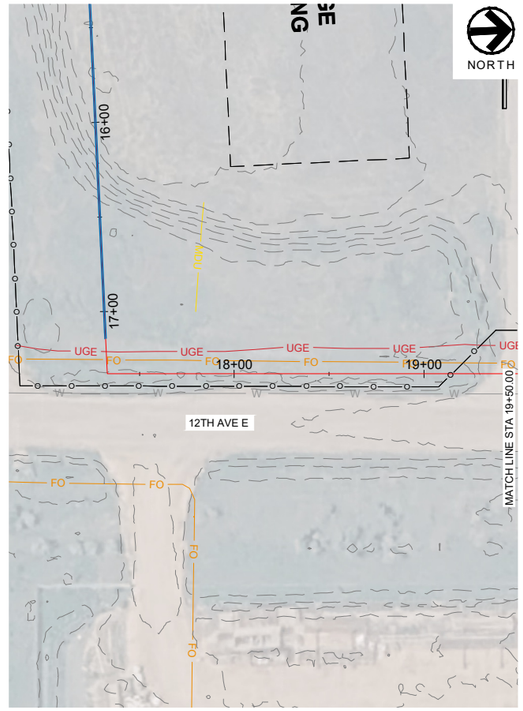
CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: RFM
CHECKED BY: KMJ
APPROVED BY: KMJ

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **C101**

Plotted: By: Richard Marohl Date: Wednesday, February 25, 2026





STA	10+00	11+00	12+00	13+00	14+00	15+00	16+00	17+00	18+00	19+00
EG	1844.35	1855.17	1854.61	1855.00	1856.06	1856.32	1856.12	1849.01	1849.00	1849.33
TOP			1841.20	1843.05	1843.26	1843.47	1843.68	1843.88	1844.09	1844.30
DEPTH			13.41	11.95	12.80	12.85	12.44	5.12	4.91	5.03

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
KEVIN JOHNSON
PE-4964
02-20-2026
Date
NORTH DAKOTA

STATUS: PRELIMINARY - NOT FOR CONSTRUCTION

APPR	DATE	SYM

0 40
Scale in Feet

GENERAL NOTES

1. CIVIL SITE WORK AND SITE PIPING ARE SHOWN FOR REFERENCE ONLY AND SHALL BE COMPLETED UNDER A SEPARATE CONTRACT. THIS CONTRACT PERTAINS TO THE PRE-PROCUREMENT OF THE PREFABRICATED PUMP STATION AND ALL CONTENTS THEREIN AS INDICATED ON THE PROCESS DRAWINGS AND AS INDICATED IN THE SPECIFICATIONS. INSTALLATION OF THE PREFABRICATED PUMP STATION SHALL BE COMPLETED UNDER A SEPARATE CONTRACT.

UTILITY AND SUE DATA

STA	TYPE	SIZE	MATERIAL	OWNER	LEVEL
12+00.00	SS	24"	PVC	**CITY**	**D**
13+34.67	SS	8"	PVC	**CITY**	**D**
13+39.67	SS	6"	PVC	**CITY**	**D**
17+21.15	UGE	UNK	UNK	**MDU**	**D**
17+25.41	COM	UNK	FO	**NCC**	**D**

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

SHEET TITLE:
PUMP STATION PLAN AND PROFILE

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: RFM
CHECKED BY: KMJ
APPROVED BY: KMJ

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **C301**

Advanced Engineering and Environmental Services, LLC www.ae2s.com

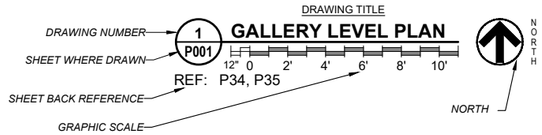
Plotted: By: Richard Marohl Date: Wednesday, February 25, 2026
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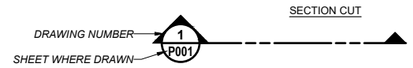
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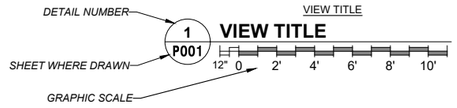
GENERAL PROCESS NOTES

1. PROCESS ITEMS IDENTIFIED ON DRAWINGS SHALL BE NEW AND FURNISHED AND INSTALLED UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL NOTE THAT ADDITIONAL CONSTRUCTION NOTES MAY BE INCLUDED ON INDIVIDUAL DRAWINGS.
3. AE2S PROCESS DRAWINGS ARE INTENDED TO BE REPRODUCED IN COLOR TO ASSIST IN IDENTIFYING PROCESS PIPING AND SELECT ITEMS. AE2S ASSUMES NO LIABILITY FOR CONTRACTORS CHOOSING TO REPRODUCE THESE DRAWINGS IN BLACK AND WHITE OR AT A SCALE WHICH REDUCES LEGIBILITY.
4. NOT ALL EQUIPMENT, PIPING, ACTUATORS, CONDUITS, PLUMBING, ETC. IS SHOWN. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION (LOCATIONS), REMOVAL, MODIFICATION, RELOCATION, RE-INSTALLATION, ETC. OF ALL MISCELLANEOUS EQUIPMENT PIPING, CONDUIT, PLUMBING, ETC. REQUIRED TO ACCOMMODATE THE INSTALLATION OF IMPROVEMENTS.
5. NOT ALL PIPE HANGERS AND SUPPORTS ARE SHOWN ON THE DRAWINGS. CONTRACTOR SHALL FIELD LOCATE PIPE SUPPORT SPACING, LAYOUT, AND TYPE TO AVOID INTERFERENCES. SEE SPECIFICATIONS FOR MAXIMUM SPACING. ENGINEER SHALL APPROVE PIPE SUPPORT LAYOUTS PRIOR TO CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL PIPING IS ADEQUATELY ANCHORED AND SUPPORTED TO PREVENT EXCESS MOVEMENT DURING TESTING AND OPERATION OF PIPING.
6. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ANY ADDITIONAL COSTS WHICH MAY RESULT FROM UNAUTHORIZED DEVIATIONS FROM THE CONTRACT DOCUMENTS.
7. SIZE OF FITTINGS AND VALVES SHALL CORRESPOND TO THE SIZE OF ADJACENT PIPING. JOINTS AND FITTING MATERIAL SHALL BE AS SHOWN FOR ADJACENT PIPING.
8. PROVIDE PROPER PLUGS, CAPS, BLIND FLANGES, AND RESTRAINTS WHEN ANY PIPING IS TERMINATED. VERIFY SIZE WITH ADJACENT PIPING AND FITTINGS.
9. CONTRACTOR SHALL PROVIDE ALL TRANSITION FITTINGS AND APPURTENANCES REQUIRED FOR TRANSITIONS BETWEEN DIFFERENT PIPE MATERIALS AND JOINT TYPES.
10. ALL SUBMERGED ANCHOR BOLTS, NUTS, FASTENERS, ETC., SHALL BE 304 STAINLESS STEEL UNLESS OTHERWISE NOTED.
11. USE OF UNI-FLANGES SHALL ONLY BE ALLOWED WITH PRIOR APPROVAL OF ENGINEER.
12. ALL PRODUCTS THAT MAY COME INTO CONTACT WITH WATER INTENDED FOR PUBLIC WATER SYSTEMS SHALL MEET AMERICAN NATIONAL STANDARD INSTITUTE (ANSI) AND NATIONAL SANITATION FOUNDATION (NSF) STANDARD 61. A PRODUCT WILL BE CONSIDERED AS MEETING THIS STANDARD IF CERTIFIED BY NSF, THE UNDERWRITERS LABORATORIES (UL) OR OTHER ORGANIZATIONS ACCREDITED BY ANSI TO TEST AND CERTIFY SUCH PRODUCTS. PRODUCT SHALL BE STAMPED OR HAVE AN ATTACHED PERMANENT LABEL. PIPES SHALL HAVE THE LABEL OR STAMP ALONG THE FULL LENGTH OF THE PIPE.
13. THE PROCESS DRAWINGS INDICATE REQUIRED PIPE SIZES, ELEVATIONS, AND THE EXTENT AND GENERAL ARRANGEMENT FOR PROCESS PIPING AND EQUIPMENT. PRIOR TO THE FABRICATION OR INSTALLATION OF ANY PIPING OR EQUIPMENT THE CONTRACTOR SHALL CONSULT ALL DRAWINGS AND CONSTRUCTION TRADES TO ACQUAINT SELF WITH THE MATERIALS, FINISHES, AND LOCATIONS OF EXISTING AND NEW CEILINGS, STRUCTURAL MEMBERS, PIPES, DUCTS, LIGHTING FIXTURES, CONDUITS, ETC. WHICH MAY AFFECT THE INSTALLATION. COORDINATE THE WORK WITH OTHER TRADES AND MAKE MODIFICATIONS IN LAYOUT TO AVOID CONFLICT WITH THE WORK OF OTHER TRADES.
14. VERIFY FINAL VALVE OPERATOR / ACTUATOR ORIENTATION WITH ENGINEER.
15. NOT ALL PIPING FLOOR AND WALL PENETRATIONS ARE SHOWN. CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE PROPER PENETRATION INCLUDING CONCRETE CORING, FLOOR SLEEVES, LINK-TYPE SEALS, CAULKING, AND GROUTING.

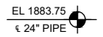
DRAWING, SECTION, AND DETAIL CONVENTIONS



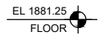




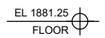
DRAWING SYMBOLS LEGEND



NEW ELEVATION & LOCATION IN SECTION VIEW
CENTERLINE ELEVATION



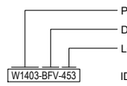
NEW ELEVATION & LOCATION IN SECTION VIEW
FLOOR, WALL, OR SURFACE ELEVATION



EXISTING ELEVATION & LOCATION IN SECTION VIEW
FLOOR, WALL, OR SURFACE ELEVATION



BREAKLINE (OBJECT CONTINUES, DRAWING ENDS)



IDENTIFICATION TAG

SCHEDULE NOTE FOR PIPE, FITTINGS, OR EQUIPMENT



CONSTRUCTION NOTE
CONSTRUCTION NOTE CALL-OUT WILL BE PLACED AT THE NEAREST POSSIBLE LOCATION TO THE WORK IT IS DESCRIBING.



DEMOLITION NOTE
DEMOLITION NOTE CALL-OUT WILL BE PLACED AT THE NEAREST POSSIBLE LOCATION TO THE WORK IT IS DESCRIBING.



WATER FLOW DIRECTION



INTAKE AIR FLOW DIRECTION



EXHAUST AIR FLOW DIRECTION

Plotted By: Richard Marohl Date: Tuesday, February 24, 2026

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively



STATUS: PRELIMINARY - NOT FOR CONSTRUCTION

APPR	DATE	SYM

PAINTING REQUIREMENTS

INTERIOR	TWO COATS - 9MIL DRY TOTAL TNEMEC SERIES 66
EXTERIOR	THREE COATS - 16MIL DRY TOTAL TNEMEC SERIES 66
PIPING EXTERIOR	TWO COATS - 9MIL DRY TOTAL TNEMEC SERIES 66, COLOR TO BE SAFETY BLUE.

GENERAL NOTES

1. COORDINATE FINAL LOCATIONS OF HALF-COUPLINGS WITH ENGINEER DURING SUBMITTAL PROCESS.

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
NOTES AND LEGEND

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

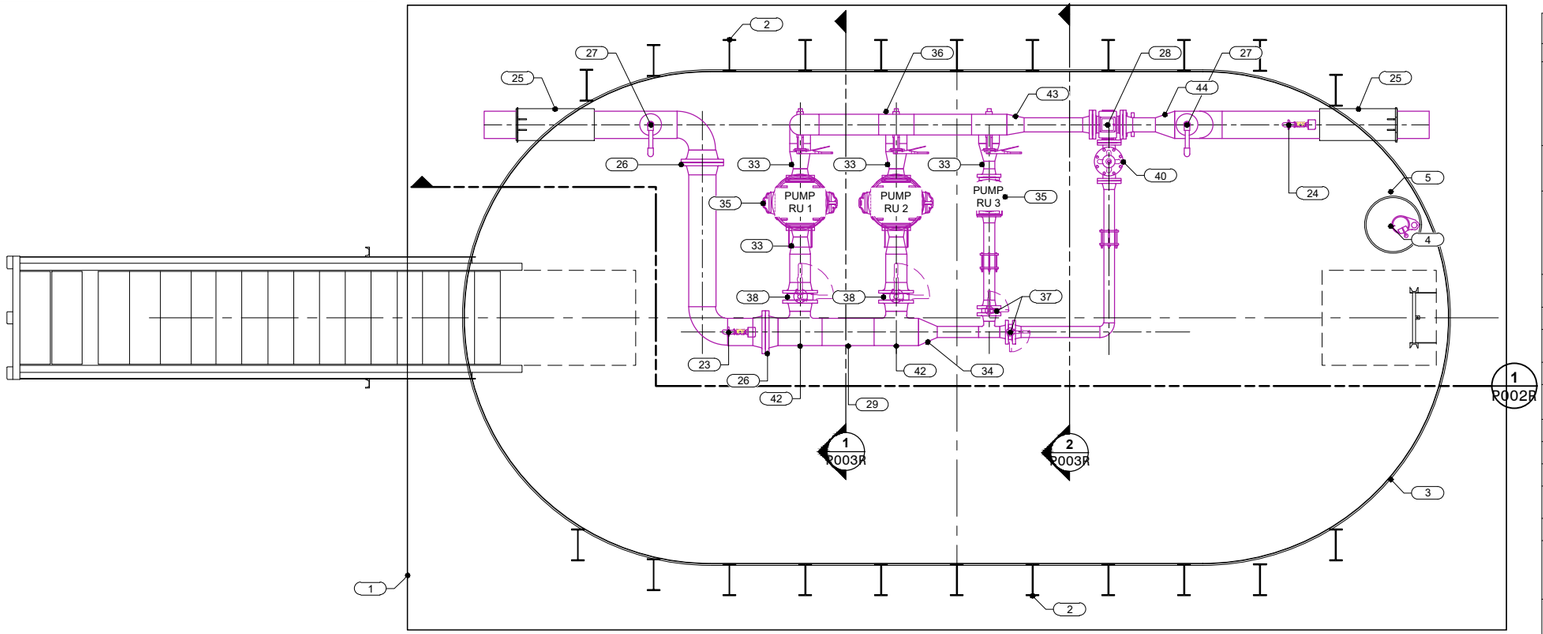
PREPARED BY: RFM
CHECKED BY: KMJ
APPROVED BY: KMJ

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:

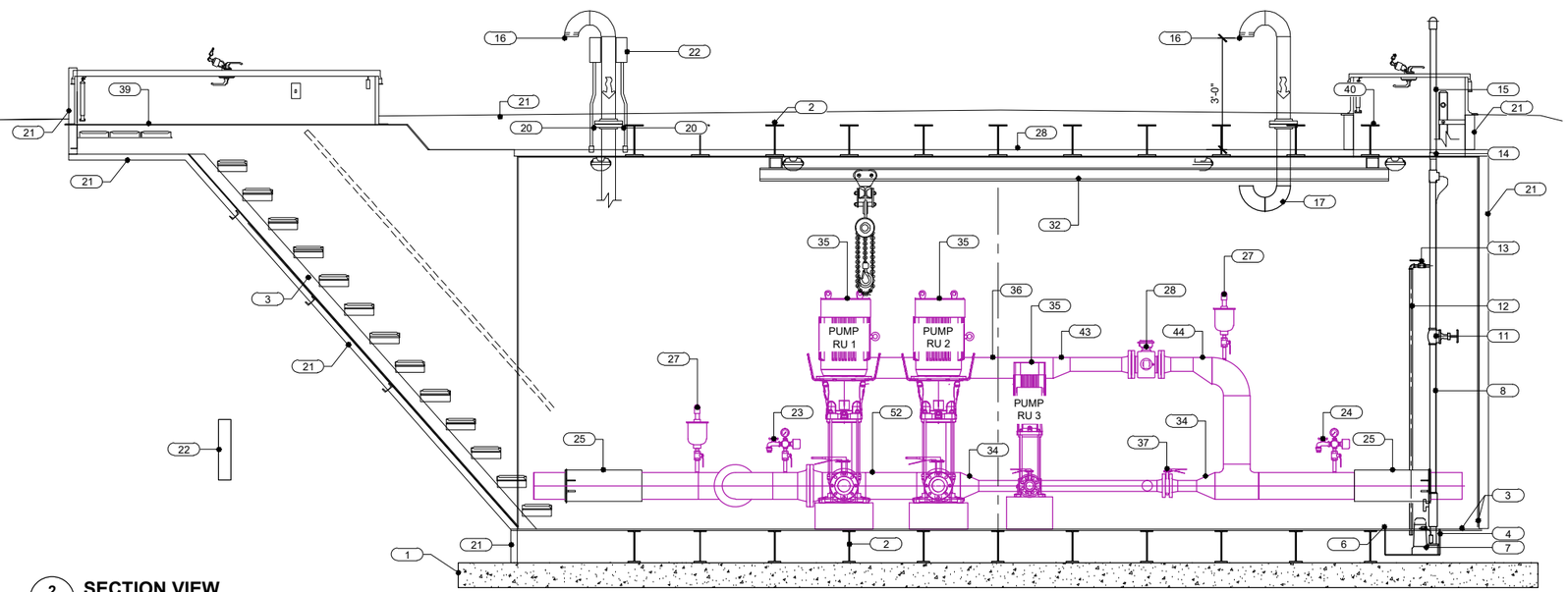
SHEET DESIGNATOR:

SHEET NO:
P001

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Plotted By: Richard Marohl Date: Wednesday, March 18, 2026



1 P002R **PLAN VIEW**



2 P002R **SECTION VIEW**

PIPING & EQUIPMENT SCHEDULE

MARK	DESCRIPTION
1	CONCRETE SLAB - DESIGN SHALL BE BY THE PUMP STATION PRE-FABRICATOR AND FOR THE EXISTING SOIL CONDITIONS. APPROXIMATE DIMENSIONS OF 29FT X 16.5 FT SHOWN. FINAL CONCRETE SLAB DIMENSION SHALL BE AS DETERMINED BY THE VAULT MANUFACTURER / SUPPLIER.
2	STEEL VAULT SUPPORT BEAMS - SIZE AND LOCATION SHALL BE AS DETERMINED BY THE STEEL VAULT PRE-FABRICATOR.
3	STEEL VAULT - FLOOR, WALLS, ROOF, STAIRS, PENETRATIONS, LIFT EYES, ETC. BY PRE-FABRICATOR. APPROXIMATE DIMENSIONS OF 25 FT L x 13 FT W x 10 FT H SHOWN. FINAL STEEL VAULT DIMENSIONS SHALL BE AS DETERMINED BY THE VAULT MANUFACTURER / SUPPLIER
4	SUMP - SIZE SHALL BE AS DETERMINED BY THE STEEL VAULT PRE-FABRICATOR
5	ANODE - 1 LB, BARE MAGNESIUM
6	EXOTHERMIC WELD (PRIOR TO PAINTING) No. 10 COPPER WIRE w/HMW-PE INSULATION
7	SUMP PUMP w/SCREEN
8	SUMP DISCHARGE PIPING - 1.5" SCH 40 PVC (INSIDE VAULT)
9	UNION - 1.5"
10	CHECK VALVE - 1.5"
11	GATE VALVE - 1.5"
12	SUMP DISCHARGE PIPING DRAIN - 1/2" SCH 40 PVC PIPE TO SUMP
13	BALL VALVE - 0.5"
14	TRANSITION COUPLING - 1.5" SCH 40 PVC TO SCH 80 PVC (OUTSIDE VAULT). INSTALL GALV. PIPE AND COUPLING PRIOR TO VAULT INSULATION APPLICATION.
15	SUMP DISCHARGE PIPING - 1.5" SCH 80 PVC (OUTSIDE VAULT) INSULATED, SCREEN OUTLET. COORDINATE ROUTING WITH SITE GRADING.
16	VAULT AIR INTAKE - 6" SCREENED (REMOVABLE) AIR INTAKE COATED w/SERIES 66
17	VAULT AIR INTAKE - 0.25" DRAIN COUPLING w/PLUG
18	VAULT AIR EXHAUST - 6"
19	EQUIPMENT HATCH 30"X36"
20	POWER SERVICE (VERIFY SIZE) SEE SPECIFICATIONS
21	ENTIRE EXTERIOR TOP, RISER, AND WALLS TO BE COATED w/URETHANE FOAM INSULATION TO R-19 VALUE w/WATER EMULSIVE COATING ON EXTERIOR OF FOAM
22	SACRIFICIAL ANODES, EIGHT (8) REQUIRED.
23	PUMP STATION INLET PRESSURE ASSEMBLY, SEE DETAIL: 4/D102
24	PUMP STATION OUTLET PRESSURE ASSEMBLY, SEE DETAIL: 4/D102
25	8" WALL PIPE w/RESTRAINING TAB & GUSSETS
26	WELD ON FLANGE, SIZE & STYLE VARIES
27	1" HALF-COUPLING FOR AIR RELEASE VALVE ASSEMBLY, SEE DETAIL 3/D102
28	4" MAGNETIC FLOW METER w/METER MOUNTED READOUT.
29	8" BUTT WELD PUMP SUCTION HEADER PIPE w/BRANCH NOZZLES
30	6" WAFER CHECK VALVE (300 PSI RATED)
31	6" WAFER BUTTERFLY VALVE W/LEVER (300 PSI RATED)
32	BUILDING TROLLEY AND HOIST
33	6"x4" BW CONCENTRIC REDUCER
34	8"x3" BW CONCENTRIC REDUCER
35	PUMP MULTISTAGE VERTICAL CENTRIFUGAL, MOTOR, AND BASE
36	6" BUTT WELD PUMP DISCHARGE HEADER PIPE w/BRANCH NOZZLES
37	3" WAFER BUTTERFLY VALVE w/LEVER
38	6" WAFER BUTTERFLY VALVE w/LEVER
39	ENTRY HATCH - BILCO L50 30" x 96" HATCH INSULATED, w/HOLD-OPEN ARM, AND HASP FOR PADLOCK AND STAIR SYSTEM
40	3" PRESSURE RELIEF VALVE
41	ENTRY HATCH - BILCO S50 30" x 36" HATCH INSULATED, w/HOLD-OPEN ARM, AND HASP FOR PADLOCK AND ALUMINUM LADDER W LU-1 SAFETY POST
42	8"X6" BW TEE
43	6"X4" ECCENTRIC REDUCER
44	8"X4" ECCENTRIC REDUCER

AE2S

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
KEVIN JOHNSON
PE-4964
03-18-2026
Date
NORTH DAKOTA

STATUS: **PRELIMINARY - NOT FOR CONSTRUCTION**

SYM	DATE	APPR

GENERAL NOTES

1. SEE SHEET P001 FOR GENERAL PROCESS NOTES.

SHEET RE-ISSUED BY ADDENDUM 1

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
PLAN AND SECTION VIEW

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: RFM
CHECKED BY: KMJ
APPROVED BY: KMJ

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **P002R**

File: C:\Users\RMarohl\DOAC\CDocs\AE2S\00581-2025-003 Williston WRRF Water Reuse - Muni Golf\Project Files\04-Process\Autocad\Plan Sheets\Plan Sheets.dwg

1 P003R **PUMP 1 AND 2 SECTION VIEW**

2 P003R **PUMP 3 SECTION VIEW**

PIPING & EQUIPMENT SCHEDULE

MARK	DESCRIPTION
1	CONCRETE SLAB - DESIGN SHALL BE BY THE PUMP STATION PRE-FABRICATOR AND FOR THE EXISTING SOIL CONDITIONS. APPROXIMATE DIMENSIONS OF 29FT X 16.5 FT SHOWN. FINAL CONCRETE SLAB DIMENSION SHALL BE AS DETERMINED BY THE VAULT MANUFACTURER / SUPPLIER.
2	STEEL VAULT SUPPORT BEAMS - SIZE AND LOCATION SHALL BE AS DETERMINED BY THE STEEL VAULT PRE-FABRICATOR.
3	STEEL VAULT - FLOOR, WALLS, ROOF, STAIRS, PENETRATIONS, LIFT EYES, ETC. BY PRE-FABRICATOR. APPROXIMATE DIMENSIONS OF 25 FT L x 13 FT W x 10 FT H SHOWN. FINAL STEEL VAULT DIMENSIONS SHALL BE AS DETERMINED BY THE VAULT MANUFACTURER / SUPPLIER
4	SUMP - SIZE SHALL BE AS DETERMINED BY THE STEEL VAULT PRE-FABRICATOR
5	ANODE - 1 LB, BARE MAGNESIUM
6	EXOTHERMIC WELD (PRIOR TO PAINTING) No. 10 COPPER WIRE w/HMW-PE INSULATION
7	SUMP PUMP w/SCREEN
8	SUMP DISCHARGE PIPING - 1.5" SCH 40 PVC (INSIDE VAULT)
9	UNION - 1.5"
10	CHECK VALVE - 1.5"
11	GATE VALVE - 1.5"
12	SUMP DISCHARGE PIPING DRAIN - 1/2" SCH 40 PVC PIPE TO SUMP
13	BALL VALVE - 0.5"
14	TRANSITION COUPLING - 1.5" SCH 40 PVC TO SCH 80 PVC (OUTSIDE VAULT). INSTALL GALV. PIPE AND COUPLING PRIOR TO VAULT INSULATION APPLICATION.
15	SUMP DISCHARGE PIPING - 1.5" SCH 80 PVC (OUTSIDE VAULT) INSULATED, SCREEN OUTLET. COORDINATE ROUTING WITH SITE GRADING.
16	VAULT AIR INTAKE - 6" SCREENED (REMOVABLE) AIR INTAKE COATED w/SERIES 66
17	VAULT AIR INTAKE - 0.25" DRAIN COUPLING w/PLUG
18	VAULT AIR EXHAUST - 6"
19	EQUIPMENT HATCH 30"X36"
20	POWER SERVICE (VERIFY SIZE) SEE SPECIFICATIONS
21	ENTIRE EXTERIOR TOP, RISER, AND WALLS TO BE COATED w/URETHANE FOAM INSULATION TO R-19 VALUE w/WATER EMULSIVE COATING ON EXTERIOR OF FOAM
22	SACRIFICIAL ANODES, EIGHT (8) REQUIRED.
23	PUMP STATION INLET PRESSURE ASSEMBLY, SEE DETAIL: 4/D102
24	PUMP STATION OUTLET PRESSURE ASSEMBLY, SEE DETAIL: 4/D102
25	8" WALL PIPE w/RESTRAINING TAB & GUSSETS
26	WELD ON FLANGE, SIZE & STYLE VARIES
27	1" HALF-COUPLING FOR AIR RELEASE VALVE ASSEMBLY, SEE DETAIL 3/D102
28	4" MAGNETIC FLOW METER w/METER MOUNTED READOUT.
29	8" BUTT WELD PUMP SUCTION HEADER PIPE w/BRANCH NOZZLES
30	6" WAFER CHECK VALVE (300 PSI RATED)
31	6" WAFER BUTTERFLY VALVE W/LEVER (300 PSI RATED)
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33	6"x4" BW CONCENTRIC REDUCER
34	8"x3" BW CONCENTRIC REDUCER
35	PUMP MULTISTAGE VERTICAL CENTRIFUGAL, MOTOR, AND BASE
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38	6" WAFER BUTTERFLY VALVE w/LEVER
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40	3" PRESSURE RELIEF VALVE
41	ENTRY HATCH - BILCO S50 30" x 36" HATCH INSULATED, w/HOLD-OPEN ARM, AND HASP FOR PADLOCK AND ALUMINUM LADDER W LU-1 SAFETY POST
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AE2S

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
KEVIN JOHNSON
PE-4964
03-18-2026
Date
NORTH DAKOTA

STATUS: **PRELIMINARY - NOT FOR CONSTRUCTION**

SYM	DATE	APPR

GENERAL NOTES

1. SEE SHEET P001 FOR GENERAL PROCESS NOTES.

SHEET RE-ISSUED BY ADDENDUM 1

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

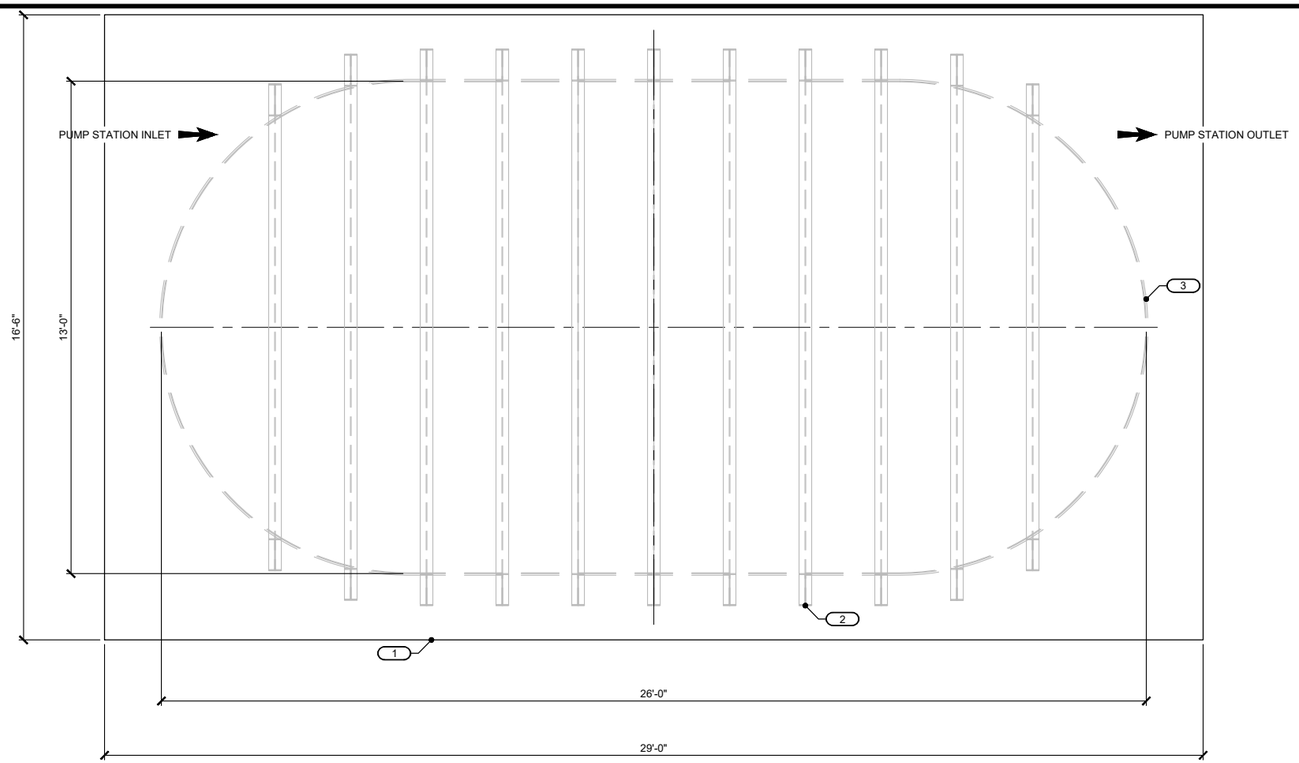
Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
SECTION VIEW

CLIENT: CITY OF WILLISTON, WILLISTON, ND	PREPARED BY: RFM
	CHECKED BY: KMJ
	APPROVED BY: KMJ
PROJECT NO: P00581-2025-003	SHEET DESIGNATOR:
DATE: FEBRUARY 2026	SHEET NO: **P003R**
ALT. PROJECT NO:	

Plotted By: Richard Marohl Date: Wednesday, March 18, 2026

File: C:\Users\RMarohl\ADOA\CD\cosk\AE2S\00581-2025-003 Williston WRRF Water Reuse - Muni Golf\Project Files\04-Process\Autocad\Plan Sheets\Plan Sheets.dwg



1 P004 **BASE SLAB - PLAN**
SCALE: NONE

PIPING & EQUIPMENT SCHEDULE

MARK	DESCRIPTION
1	CONCRETE SLAB - DESIGN SHALL BE BY THE PUMP STATION PRE-FABRICATOR AND FOR THE EXISTING SOIL CONDITIONS. APPROXIMATE DIMENSIONS OF 29FT X 16.5 FT SHOWN. FINAL CONCRETE SLAB DIMENSION SHALL BE AS DETERMINED BY THE VAULT MANUFACTURER / SUPPLIER.
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3	STEEL VAULT - FLOOR, WALLS, ROOF, STAIRS, PENETRATIONS, LIFT EYES, ETC. BY PRE-FABRICATOR. APPROXIMATE DIMENSIONS OF 25 FT L x 13 FT W x 10 FT H SHOWN. FINAL STEEL VAULT DIMENSIONS SHALL BE AS DETERMINED BY THE VAULT MANUFACTURER / SUPPLIER
4	SUMP - SIZE SHALL BE AS DETERMINED BY THE STEEL VAULT PRE-FABRICATOR
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6	EXOTHERMIC WELD (PRIOR TO PAINTING) No. 10 COPPER WIRE w/HMW-PE INSULATION
7	SUMP PUMP w/SCREEN
8	SUMP DISCHARGE PIPING - 1.5" GALVANIZED (INSIDE VAULT)
9	UNION - 1.5"
10	CHECK VALVE - 1.5"
11	GATE VALVE - 1.5"
12	SUMP DISCHARGE PIPING DRAIN - 1/2" COPPER PIPE TO SUMP
13	BALL VALVE - 0.5"
14	TRANSITION COUPLING - 1.5" GALV. TO SCH 80 PVC (OUTSIDE VAULT). INSTALL GALV. PIPE AND COUPLING PRIOR TO VAULT INSULATION APPLICATION.
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22	SACRIFICIAL ANODES, EIGHT (8) REQUIRED.
23	PUMP STATION INLET PRESSURE ASSEMBLY, SEE DETAIL: 4/D102
24	PUMP STATION OUTLET PRESSURE ASSEMBLY, SEE DETAIL: 4/D102
25	8" WALL PIPE w/RESTRAINING TAB & GUSSETS
26	WELD ON FLANGE, SIZE & STYLE VARIES
27	1" HALF-COUPLING FOR AIR RELEASE VALVE ASSEMBLY, SEE DETAIL 3/D102
28	6" E&H MAGNETIC FLOW METER w/METER MOUNTED READOUT.
29	8" BUTT WELD PUMP SUCTION HEADER PIPE w/BRANCH NOZZLES
30	8" FLANGED GLOBE CHECK VALVE
31	8" WAFER BUTTERFLY VALVE w/LEVER
32	DPI BUILDING TROLLEY AND HOIST
33	8"x4" BW CONCENTRIC REDUCER
34	8"x3" BW CONCENTRIC REDUCER
35	PUMP MULTISTAGE VERTICAL CENTRIFUGAL, MOTOR, AND BASE
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37	3" WAFER BUTTERFLY VALVE w/LEVER
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41	ENTRY HATCH - BILCO S50 30" x 36" HATCH INSULATED, w/HOLD-OPEN ARM, AND HASP FOR PADLOCK AND ALUMINUM LADDER W LU-1 SAFETY POST

AE2S

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
KEVIN JOHNSON
PE-4964
02-20-2026
Date
NORTH DAKOTA

STATUS: PRELIMINARY - NOT FOR CONSTRUCTION

SYM	DATE	APPR

GENERAL NOTES

1. SEE SHEET P001 FOR GENERAL PROCESS NOTES.

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
CONCRETE SLAB

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: RFM
CHECKED BY: KMJ
APPROVED BY: KMJ

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **P004**

Plotted By: Richard Marohl Date: Tuesday, February 24, 2026

File: C:\Users\ian\ID\CAD\CDocs\AE2S\00581-2025-003 Williston WRRF Water Reuse - Muni Golf\Project Files\06-Electrical\Autocad\Plan Sheet\E-Symbols and Abbreviations.dwg

ELECTRICAL ABBREVIATIONS

A	AMPERES
AC	ABOVE COUNTER (VERIFY HEIGHT)
ACK	ACKNOWLEDGE
AE	ANALYZER ELEMENT
AI	ANALOG INPUT
AIT	ANALYZER INDICATION TRANSMITTER
A.F.F.	ABOVE FINISHED FLOOR
AM	AMMETER
ANN	ANNUNCIATOR
AO	ANALOG OUTPUT
AWG	AMERICAN WIRE GAGE
BKR	BREAKER
BLDG	BUILDING
CKT	CIRCUIT
℄	CENTER LINE
CONTR	CONTRACTOR
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CS	CONTROL STATION
CT	CURRENT TRANSFORMER
DE	DUAL ELEMENT
DI	DIGITAL INPUT
DISC	DISCONNECT
DO	DIGITAL OUTPUT
DP	DAMP PROOF
EC	ELECTRICAL CONTRACTOR
ELEC	ELECTRICAL
EMT	ELECTRICAL METALLIC TUBING
EXP	EXPLOSION PROOF
EQUIP	EQUIPMENT
F&I	FURNISH AND INSTALL
FCV	FLOW CONTROL VALVE
FE	FLOW ELEMENT
FIT	FLOW INDICATING TRANSMITTER
FS	FLOW SWITCH
FU	FUSE OR FUSIBLE
GC	GENERAL CONTRACTOR
GDE	GAS DETECT ELEMENT
GFI	GROUND FAULT INTERRUPTER
GND	GROUND
GRS	GALVANIZED RIGID STEEL CONDUIT
HD	HEAVY DUTY
HH	HANDHOLE
H/R	HAND/REMOTE
HOA	HAND-OFF-AUTO
HOL	HAND-OFF-LOCAL
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
HS	HAND SWITCH
HTR	HEATER
HZ	HERTZ (CYCLES / SECOND)
IMC	INTERMEDIATE METAL CONDUIT
JB	JUNCTION BOX
KVA	KILOVOLT-AMPERES
KVAR	KILOVOLT-AMPERES REACTIVE
KW	KILOWATTS
LIT	LEVEL INDICATING TRANSMITTER
LMF	LIQUID-TIGHT METALLIC CORE FLEXIBLE CONDUIT
LSH	LEVEL SWITCH HIGH
LSHH	LEVEL SWITCH HIGH HIGH
LSL	LEVEL SWITCH LOW
LSLL	LEVEL SWITCH LOW LOW
M	MOTOR STARTER OPERATING COIL
MAX	MAXIMUM
MCM	THOUSAND CIRCULAR MILS
MCP	MOTOR CIRCUIT PROTECTOR
MECH	MECHANICAL
MFR	MANUFACTURER
MH	METAL HALIDE
MIN	MINUTE OR MINIMUM
MTD	MOUNTED
NF	NON-FUSED
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NTC	NOT CONNECTED
OL(S)	OVERLOAD RELAY CONTACT(S)
PF	POWER FACTOR
PIT	PRESSURE INDICATING TRANSMITTER
PLC	PROGRAMMABLE LOGIC CONTROLLER
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
PTT	PUSH TO TEST
PVC	POLYVINYLCHLORIDE CONDUIT
REQ'D	REQUIRED
RS	RIGID STEEL CONDUIT
RTD	RESISTANCE TEMPERATURE DETECTOR
RTM	RUNNING TIME METER
RTR	REMOTE TEST / RESET
SCP	SUPERVISORY CONTROL PANEL
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
SE	SERVICE ENTRANCE
SEC	SECOND OR SECONDARY
SIG	SIGNAL
SOL Vv	SOLENOID VALVE
SP	SINGLE POLE
SPECS	SPECIFICATIONS
SSNR	"SOFT START" NON-REVERSING SWITCH
SSR SW	"SOFT START" REVERSING SWITCH
SUSE	SUITABLE FOR USE AS SERVICE ENTRANCE
TD	TIME DELAY
TEMP	TEMPERATURE
TIT	TEMPERATURE INDICATING TRANSMITTER
TS	MOTOR THERMAL SWITCH
TSTAT	THERMOSTAT
UH	UNIT HEATER
V	VOLTS
VFD	VARIABLE FREQUENCY DRIVE
VM	VOLTMETER
VS	VOLTMETER SWITCH
Vv	VALVE
W	WATTS OR WIRE
W/	WITH
WW	WIREWAY
WP	WEATHERPROOF
XFMR	TRANSFORMER
ZC	POSITION CONTROLLER
ZI	POSITION INDICATOR
ZSC	POSITION SWITCH CLOSED
ZSO	POSITION SWITCH OPENED

ONE-LINE DIAGRAM AND SCHEMATIC SYMBOLS

- PRESS TO TEST LAMP (LETTER DENOTES COLOR)
- RUN / OFF / AUTO SELECTOR SWITCH
- CIRCUIT BREAKER
- MAGNETIC TRIP
- THERMAL TRIP
- RUNNING TIME METER
- CONTACT (N.C., N.O.)
- OPERATING COIL (LETTER OR NUMBER DENOTES DEVICE)
- 30A FUSE (NUMBER DENOTES RATING)
- DISCONNECT SWITCH
- DE-ENERGIZED TIMER CONTROL (N.C., N.O.)
- ENERGIZED TIMER CONTROL (N.C., N.O.)
- FLOW SWITCH (N.C., N.O.)
- LIMIT SWITCH (N.C., N.O.)
- LIQUID LEVEL SWITCH (N.C., N.O.)
- PRESSURE SWITCH (N.C., N.O.)
- TEMPERATURE SWITCH (N.C., N.O.)
- TORQUE SWITCH (N.C., N.O.)
- PUSHBUTTON CONTACT (OFF, ON)
- DOUBLE CIRCUIT PUSHBUTTON SWITCH
- SURGE CAPACITOR
- POWER FACTOR CAPACITOR WITH FUSING AND INDICATING LIGHTS
- FUSED DISCONNECT SWITCH
- LINE REACTOR
- DRAW-OUT CIRCUIT BREAKER
- GROUND CONNECTION
- CHASSIS CONNECTION
- INDICATING LIGHT (LETTER DENOTES COLOR) (PTT = PUSH TO TEST)
- CONTROL OR POTENTIAL TRANSFORMER
- THERMAL OVERLOAD TRIP UNITS
- DEVICE MOUNTED IN MOTOR CONTROL CENTER (MCC)
- DEVICE MOUNTED IN FIELD
- GROUND ROD
- LIGHTNING ARRESTOR
- CONTROL OR INSTRUMENT SWITCH (LETTERS DENOTES FUNCTION)
- CURRENT TRANSFORMER
- POTENTIAL TRANSFORMER (DRAW OUT TYPE WITH PRIMARY FUSES)
- CONTROL STATION
- INSTRUMENT (LETTER DENOTES TYPE)
- MOTOR (NUMBER DENOTES HP)
- MOTOR (NUMBER DENOTES HP) (TS = THERMAL SWITCH)
- MOTOR (NUMBER DENOTES HP) (SENSOR = SEAL FAIL)
- MOTOR CIRCUIT PROTECTOR (MCP)
- MOLDED CASE CIRCUIT BREAKER
- GENERATOR
- GROUND / NEUTRAL
- HEATER

CIRCUIT DESIGNATOR

REFER TO CABLE & CONDUIT SCHEDULE(S)

- C9999
  - NUMERALS INDICATE CIRCUIT NUMBER
  - 'C' PREFIX INDICATES THE CIRCUITS CONDUIT CONTAINS OTHER CIRCUITS OR IS AN EMPTY CONDUIT
  - LEADER ADDED FOR CLARITY WHEN SHOWN

CIRCUIT LEGEND

- NUMBER OF CABLES
- QUANTITY OF CONDUCTORS PER CABLE
- CONDUCTOR SIZE OR TYPE
- CONDUIT SIZE & TYPE

2 - 1/C - #12 - 3/4"

LINETYPE LEGEND

- NEW EQUIPMENT
- EXISTING EQUIPMENT
- FUTURE EQUIPMENT

DEMOLITION LEGEND

- ITEMS TO BE REMOVED
- ITEMS TO BE REUSED

COMMUNICATION / SECURITY / FIRE PROTECTION SYMBOLS

- ANTENNA
- DUCT DETECTOR REMOTE INDICATOR
- DUCT SMOKE DETECTOR
- SMOKE DETECTOR
- HEAT DETECTOR (R = RATE OF RISE, 135° = FIXED RATE, MP = MOISTURE AND DUST PROOF, C = COMBINATION)
- PULL STATION
- FIRE ALARM HORN ONLY
- STROBE ONLY (NUMBER INDICATES CANDELA RATING)
- PULL STATION (CHEMICAL)
- CHEMICAL HORN / STROBE
- FIRE CHIME / STROBE
- FIRE HORN / STROBE (NUMBER INDICATES CANDELA RATING)
- OTHER ALARM HORN / STROBE (NUMBER INDICATES CANDELA RATING)
- MAGNETIC DOOR HOLDER
- FIRE SPRINKLER TAMPER SWITCH
- FIRE SPRINKLER FLOW SWITCH
- DRY SYSTEM PRESSURE SYSTEM
- 'E' INDICATES EXISTING DEVICE TO REMAIN
- DOOR ACCESS CONTROLLER
- MAGNETIC DOOR SWITCH
- SECURITY KEYPAD
- CARD READER (PROXIMITY TYPE)
- ELECTRIC DOOR STRIKE
- INTERCOM STATION
- REQUEST TO EXIT
- PAGING SYSTEM HORN
- PAGING SYSTEM SPEAKER
- VOLUME CONTROL
- FIRE ALARM CONTROL PANEL
- FIRE ALARM REMOTE ANNUNCIATOR PANEL
- ADMIN NETWORK DATA OUTLET (X) INDICATES JACK QUANTITY
- SCADA NETWORK DATA OUTLET (X) INDICATES JACK QUANTITY
- SCADA NETWORK / ADMIN NETWORK DATA OUTLET (X) - SCADA NETWORK JACK QUANTITY (X) - ADMIN NETWORK JACK QUANTITY
- SECURITY CAMERA
- WIRELESS ACCESS POINT (WAP)

DEVICE SYMBOLS

- WALL MOUNTED / CEILING EXIT LIGHT (LETTER & NUMBER SIMILAR TO HID OR INCANDESCENT FIXTURE, SHADING DENOTE FACE(S) AND ARROW(S) IF REQUIRED)
- WALL / CEILING MOUNTED FLUORESCENT / INDUCTION / LED FIXTURE (CAPITAL LETTER DENOTES TYPE, NUMBER DENOTES CIRCUIT, SMALL LETTER DENOTES SWITCH LEG)
- WALL MOUNTED / CEILING / HUNG LINEAR FIXTURES (LETTERS & NUMBERS SIMILAR TO FIXTURES ABOVE)
- HALF SOLID FIXTURE INDICATES FIXTURE IS ON AN EMERGENCY CIRCUIT (NL = UNSWITCHED LIGHTING CIRCUIT)
- NUMBER DENOTES DUPLEX CONVENIENCE OUTLET (CIRCUIT & INCHES DENOTE MOUNTING HEIGHT IF OTHER THAN NORMAL, LETTERS SPECIFY OTHER CONDITIONS ie: WP, DP, OR GFI)
- GFCI RECEPTACLE
- ABOVE COUNTER RECEPTACLE
- FLOOR MOUNTED RECEPTACLE
- DOUBLE DUPLEX RECEPTACLE
- REMOTE TEST / RESET (RTR)
- BELOW-GRADE HANDHOLE / PULLBOX (SEE TYPICAL DETAIL)
- SPECIAL PURPOSE RECEPTACLE
- JUNCTION BOX-CEILING / WALL MOUNTED
- MECHANICAL THERMOSTAT
- PHOTO SENSOR
- SWITCH (NO MARKING IS SINGLE POLE, 2 IS DOUBLE POLE, 3 IS 3-WAY, 4 IS 4-WAY)
- ELECTRICAL CONNECTION (NON DRAFTED / MODELED ELEMENT)
- MOTOR
- CIRCUITRY (EXPOSED, SURFACE MOUNTED)
- CIRCUITRY (BELOW GRADE OR FLOOR)
- CIRCUITRY (CONCEALED IN STRUCTURE)
- GROUND
- PUSHBUTTON CONTROL STATION
- DISCONNECT SWITCH
- ACROSS THE LINE STARTER
- LIGHTING CONTACTOR (SEE RESPECTIVE PLAN NOTE)
- PAD MOUNT FEEDPOINT (SEE TYPICAL DETAIL)

GENERAL NOTES

1. AE2S ELECTRICAL DRAWINGS ARE INTENDED TO BE REPRODUCED IN COLOR. AE2S ASSUMES NO LIABILITY FOR CONTRACTORS CHOOSING TO REPRODUCE THESE DRAWINGS IN BLACK AND WHITE OR AT A SCALE WHICH REDUCES LEGIBILITY.
2. PLANT MUST REMAIN IN VIRTUALLY CONTINUOUS OPERATION DURING CONSTRUCTION. COORDINATE SEQUENCING, SWITCHOVERS, AND SHORT DOWNTIME PERIODS WITH LOCAL UTILITY COMPANY, THE OWNER, AND THE ENGINEER DURING CONSTRUCTION.
3. COORDINATE THE INSTALLATION OF ALL BELOW-GRADE AND CAST-IN-PLACE CIRCUITRY WITH OTHER TRADES.
4. CONTRACTOR SHALL RETURN ALL DISTURBED SURFACES AND SOILS TO ORIGINAL OR PRE-CONSTRUCTION CONDITION UNLESS SPECIFICALLY INDICATED OTHERWISE.
5. CONTRACTOR SHALL LOCATE OR SHALL HAVE THE SERVING UTILITIES LOCATE ALL UNDERGROUND CABLE, CONDUITS, PIPING, UTILITIES, ETC., PRIOR TO COMMENCING CONSTRUCTION (UNDERGROUND EXCAVATION). CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OF ANY DAMAGES DUE TO CONSTRUCTION ACTIVITIES.
6. EXISTING AND / OR NEW UNDERGROUND CONDUITS, DUCTBANK, AND OTHER CIRCUITRY SHOWN ON THE PLANS ARE INTENDED TO BE DIAGRAMMATIC IN NATURE. CONTRACTOR IS RESPONSIBLE FOR FIELD CONFIRMING ALL CIRCUITRY AND ROUTING.
7. SCHEDULE 80 PVC CONDUIT IS ALLOWED UNDERGROUND FOR NON-VFD AND NON-SIGNAL CIRCUITS. TRANSITION TO RIGID STEEL CONDUIT BEFORE EXPOSING ABOVE GRADE.
8. FIELD CONFIRM CONDUIT ROUTING. DO NOT ROUTE CONDUIT ON BUILDING EXTERIOR UNLESS NOTED OTHERWISE.
9. SEE ARCHITECTURAL, STRUCTURAL, MECHANICAL, AND PROCESS DRAWINGS FOR EXACT EQUIPMENT, PIPING, AND BUILDING LAYOUTS.
10. ALL CONDUCTORS ARE TO BE COPPER.
11. PROVIDE AS-BUILT DRAWINGS. DRAWINGS SHALL BE NEAT AND LEGIBLE.
12. COORDINATE ELECTRICAL WORK WITH OTHER TRADES.
13. PROVIDE PANEL SCHEDULES FOR ALL NEW AND / OR MODIFIED PANELS. SCHEDULES SHALL BE TYPED.
14. VERIFY LOCATION OF ALL FLOOR OUTLETS WITH ARCHITECT PRIOR TO ROUGH-IN.
15. WHERE OTHER ELECTRICAL DEVICES ARE LOCATED ADJACENT TO LIGHT SWITCHES, MOUNT ALL DEVICES AT THE SAME CENTER LINE ELEVATION. WHERE ELECTRICAL DEVICES ARE NOT LOCATED ADJACENT TO LIGHT SWITCHES, MOUNT DEVICES AT 48" A.F.F. UNLESS NOTED OTHERWISE.
16. DO NOT SCALE DRAWINGS. VERIFY DIMENSIONS IN FIELD PRIOR TO COMMENCEMENT OF WORK.
17. FINAL CONNECTIONS TO EQUIPMENT SHALL BE PER MANUFACTURER'S APPROVED WIRING DIAGRAMS, DETAILS, AND INSTRUCTIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE MATERIALS AND EQUIPMENT COMPATIBLE WITH EQUIPMENT ACTUALLY SUPPLIED.
18. ALL EMPTY RACEWAY SYSTEMS SHALL HAVE A PULLWIRE OR EQUAL AND SHALL BE IDENTIFIED AT ALL JUNCTION, PULL, AND TERMINATION POINTS USING PERMANENT METALLIC TAGS. TAG SHALL INDICATE INTENDED USE OF CONDUIT, ORIGINATION, AND TERMINATION POINTS OF EACH INDIVIDUAL CONDUIT.
19. IT IS THE INTENT OF THESE DRAWINGS AND SPECIFICATIONS TO ESTABLISH A STANDARD OF QUALITY. THE ENGINEER RESERVES THE RIGHT TO APPROVE METHODS AND MATERIALS NOT REFLECTED HEREIN.
20. CONTRACTOR SHALL VISIT SITE PRIOR TO BID AND VERIFY THAT CONDITIONS ARE AS INDICATED. CONTRACTOR SHALL INCLUDE IN THEIR BID THE COSTS REQUIRED TO MAKE WORK MEET EXISTING CONDITIONS.
21. WORK SHALL BE PERFORMED IN A WORKMANLIKE MANNER TO THE SATISFACTION OF THE ARCHITECT / ENGINEER.
22. WORK, MATERIALS, AND EQUIPMENT SHALL CONFORM TO THE LATEST EDITIONS OF LOCAL, STATE, AND NATIONAL CODES AND ORDINANCES.
23. VERIFY THAT EXACT LOCATION OF EQUIPMENT TO BE FURNISHED BY OTHERS PRIOR TO ROUGH-IN.
24. SYSTEMS SHALL BE TESTED FOR PROPER OPERATION. IF TESTS SHOW THAT WORK IS DEFECTIVE, CONTRACTOR SHALL MAKE CORRECTIONS NECESSARY AT NO COST TO OWNER.
25. SYSTEMS SHALL BE COMPLETE, OPERABLE, AND READY FOR CONTINUOUS OPERATION. LIGHTS, SWITCHES, RECEPTACLES, MOTORS, ETC., SHALL BE CONNECTED AND OPERABLE.
26. ALL CONDUIT IS TO BE RIGID STEEL WITH CAST 'FS' STYLE BOXES. MAKE FINAL EQUIPMENT CONNECTIONS USING LIQUID-TIGHT METALLIC FLEX.
27. ALL LIGHTING AND RECEPTACLE CIRCUITRY CONDUCTOR QUANTITY AND CONDUIT IS THE RESPONSIBILITY OF THE CONTRACTOR. LIGHTING CIRCUITRY IS TO BE A MINIMUM OF #12AWG COPPER IN 3/4" CONDUIT, QUANTITY AS REQUIRED.
28. ALL CABLE CONNECTIONS SHALL BE TORQUED ACCORDING TO MANUFACTURER REQUIREMENTS, UL STANDARD 486A-B, AND NEC ANNEX I AS APPLICABLE. ADDITIONALLY, CONTRACTOR SHALL MARK EACH PROPERLY TORQUED BOLT / LOCKWASHER / NUT ASSEMBLY WITH A PERMANENT PAINT STRIPE OVER BOTH THE BOLT / LOCKWASHER / NUT ASSEMBLY AND THE LUG ASSEMBLY TO INDICATE ANY CHANGES IN THE POSITION OVER TIME.

AE2S
Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER
PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

SYM	DATE	APPR

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT
Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
ELECTRICAL SYMBOLS AND ABBREVIATIONS

CLIENT: CITY OF WILLISTON, WILLISTON, ND

PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

PROJECT NO: P00581-2025-003
SHEET DESIGNATOR:
SHEET NO: **E001**
DATE: FEBRUARY 2026
ALT. PROJECT NO:

Plotted By: Ian Smith Date: Monday, February 23, 2026

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1 / E101 **PUMP STATION ELECTRICAL SITE PLAN**

20' 0 20' 40'

NORTH

AE2S

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER
PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

SYM	DATE	APPR

CONSTRUCTION NOTES

1. UTILITY SERVICE EQUIPMENT. SEE SPECIFICATION 16310 FOR ADDITIONAL DETAILS.
2. UTILITY TRANSFORMER PAD PROVIDED BY ELECTRICAL CONTRACTOR AND INSTALLED TO MEET SERVING ELECTRIC UTILITY REQUIREMENTS. SEE STANDARD DETAILS FOR ADDITIONAL INFORMATION.

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
PUMP STATION ELECTRICAL SITE PLAN

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **E101**

Plotted By: Ian Smith Date: Monday, February 23, 2026

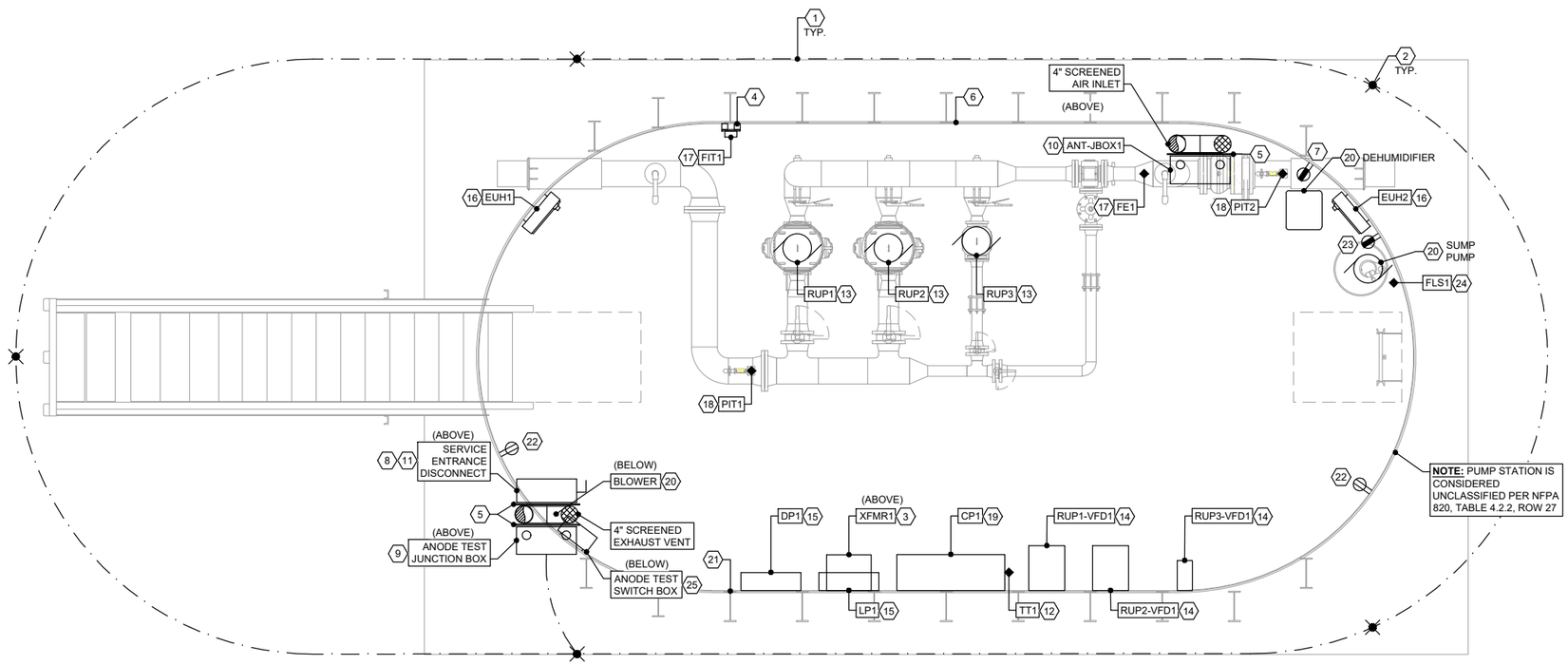
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GENERAL NOTES

1. ALL TAGS TO BE PRECEDED WITH "RPS-" UNLESS OTHERWISE DENOTED BY AN ASTERISK "*".
2. ALL EQUIPMENT AND INSTRUMENTATION WITHIN VAULT SHOWN IS TO BE INSTALLED BY PREFABRICATED PUMP STATION MANUFACTURER PRIOR TO DELIVERY PER THE SPECIFICATIONS INDICATED UNLESS OTHERWISE NOTED.
3. ALL WALL MOUNTED EQUIPMENT TO BE MOUNTED ON 5/8" STAINLESS STEEL STRUT TO PREVENT CONDENSATION BUILDUP BEHIND DEVICES.
4. ALL GENERAL BUILDING AND PROCESS MOUNTED INSTRUMENTATION, CONTROL PANELS, VFD'S, AND ASSOCIATED APPURTENANCES TO BE FURNISHED BY SYSTEMS INTEGRATOR AND INSTALLED BY PREFABRICATED PUMP STATION MANUFACTURER PRIOR TO DELIVERY UNLESS OTHERWISE NOTED. SEE BID FORM FOR ADDITIONAL INFORMATION.

CONSTRUCTION NOTES

1. #3/0 BARE STRANDED COPPER GROUND CONDUCTOR BURIED AT 3'-0" BELOW GRADE.
2. 5/8"X10' COPPER CLAD STEEL GROUND ROD WITH TOP MOUNTED AT MINIMUM OF 18" BELOW GRADE. LISTED IRREVERSIBLE COMPRESSION CONNECTION WITH ADEQUATE SLACK TO ACCOMMODATE FOR FROST FROST MOVEMENT OR BACKFILLING. GROUND CONDUCTOR.
3. TRANSFORMER PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER. MOUNT ABOVE PANELBOARD AS INDICATED.
4. WALL MOUNTED EQUIPMENT PANEL PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER TO MOUNT EQUIPMENT SHOWN. REFER TO THE "WALL MOUNTED EQUIPMENT DETAIL" FOR ADDITIONAL INFORMATION.
5. HOT DIPPED GALVANIZED STEEL MOUNTING PLATE FOR ELECTRICAL EQUIPMENT (1/4" THICK STEEL PLATE, MINIMUM) WELDED TO 4" SCREENED AIR VENTILATION PIPE. COORDINATE REQUIRED SIZE OF EACH PLATE FOR SCHEDULED ELECTRICAL EQUIPMENT. WELD PLATES TO AIR VENTILATION PIPES AND WELD IN STEEL BRACING AS REQUIRED FOR ADDITIONAL SUPPORT. COORDINATE SPACE ON EACH MOUNTING PLATE FOR REQUIRED ELECTRICAL EQUIPMENT AS INDICATED.
6. PREFABRICATED UNDERGROUND PUMP STATION. REFERENCE "P" SERIES SHEETS AND ELECTRICAL POWER SCHEMATICS FOR ADDITIONAL DETAILS.
7. (1) DEDICATED 20A GFCI DUPLEX RECEPTACLE PROVIDED BY PREFABRICATED BOOSTER STATION MANUFACTURER. FOR DEHUMIDIFIER POWER AT 42" A.F.F.
8. 600V, 400A, 3Ø, NEMA 3R HEAVY DUTY SERVICE ENTRANCE RATED DISCONNECT PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER. ON AIR INTAKE VENT TUBE AS SHOWN.
9. ANODE JUNCTION BOX PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER. SEE STANDARD DETAILS FOR ADDITIONAL INFORMATION.
10. TELEMETRY INTERFACE JUNCTION BOX PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER. SEE STANDARD DETAILS FOR ADDITIONAL INFORMATION.
11. ELECTRICAL CONTRACTOR TO INSTALL 3" SCH. 80 PVC CONDUIT FROM FROM UTILITY METER SOCKET TO SERVICE ENTRANCE RATED DISCONNECT. TRANSITION FROM SCH. 80 PVC CONDUIT BELOW GRADE TO RMC ABOVE GRADE UTILIZING A PVC COATED RMC SWEEP. FIELD CONFIRM EXACT ROUTING AND DISTANCES.
12. TEMPERATURE TRANSMITTER PROVIDED AND MOUNTED TO CONTROL PANEL EXTERITOR BY SYSTEMS INTEGRATOR. SHOWN ON PLANS FOR CLARITY.
13. PROCESS MOTORS PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER.
14. VARIABLE FREQUENCY DRIVE FURNISHED BY SYSTEMS INTEGRATOR AND INSTALLED WITHIN VAULT BY PREFABRICATED PUMP STATION MANUFACTURER. PUMP STATION MFR TO ENSURE REQUIRED WORKING CLEARANCE PER NEC. SEE ONE-LINES FOR ADDITIONAL INFORMATION.
15. PANELBOARDS PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER. MANUFACTURER TO INSURE REQUIRED WORKING CLEARANCES PER NEC.
16. 3KW ELECTRIC UNIT HEATER PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER AS SHOWN.
17. FLOW METER(S) AND FLOW METER TRANSMITTER(S) PROVIDED BY SYSTEMS INTEGRATOR AND INSTALLED BY PREFABRICATED PUMP STATION MANUFACTURER. SEE CABLE AND CONDUIT SCHEDULE FOR ADDITIONAL INFORMATION.
18. PRESSURE TRANSMITTER FURNISHED BY THE SYSTEMS INTEGRATOR AND INSTALLED BY PREFABRICATED PUMP STATION MANUFACTURER. INSTALL ON INSTRUMENT TAP PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER. COORDINATE MOUNTING LOCATION DURING CONSTRUCTION. SEE STANDARD MOUNTING DETAIL IN 'E' SHEETS AND CABLE AND CONDUIT SCHEDULE FOR ADDITIONAL INFORMATION.
19. CONTROL PANEL FURNISHED BY SYSTEMS INTEGRATOR AND TURNED OVER TO PREFABRICATED PUMP STATION MANUFACTURER FOR INSTALLATION WITHIN VAULT PRIOR TO DELIVERY. VAULT MANUFACTURER TO INSURE REQUIRED WORKING CLEARANCES PER NEC.
20. EQUIPMENT SHOWN PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER. PROVIDE LOCALLY MOUNTED DESIGNATED RECEPTACLE FOR USE WITH EQUIPMENT. SEE ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION.
21. METALLIC SIDE WALL OF STRUCTURE SHALL INCLUDE LISTED BURNDY GROUNDING SERVIT POST WELDED IN A READILY ACCESSIBLE LOCATION NOT EXPOSED TO PHYSICAL DAMAGE-ADJACENT TO ELECTRICAL SERVICE PANEL. METALLIC STRUCTURE SHALL BE BONDED TO SERVICE EQUIPMENT GROUNDING CONDUCTOR (EGC) BUS WITH #2 AWG BONDING JUMPER.
22. (2) 20A GFCI DUPLEX RECEPTACLES FURNISHED AND INSTALLED BY PREFABRICATED PUMP STATION MANUFACTURER IN LOCATIONS SHOWN 42" A.F.F.
23. (1) DEDICATED 20A GFCI DUPLEX RECEPTACLE FURNISHED AND INSTALLED BY PREFABRICATED PUMP STATION MANUFACTURER FOR SUMP PUMP POWER AT 24" A.F.F.
24. FLOOD SWITCH FURNISHED BY THE SYSTEMS INTEGRATOR AND INSTALLED BY PREFABRICATED PUMP STATION MANUFACTURER 3" A.F.F. FLOOD SWITCH SHALL HAVE MANUFACTURER CABLE TERMINATED TO LOCAL JUNCTION BOX PRIOR TO TRANSITIONING TO BUILDING WIRE. COORDINATE MOUNTING HEIGHT AND LOCATION DURING CONSTRUCTION.
25. ANODE TEST SWITCH BOX PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER. SEE SPECIFICATION (02608) FOR ADDITIONAL INFORMATION.



1 / E102 **PUMP STATION ELECTRICAL FLOOR PLAN**

12" 0 1' 2' 3' 4' 5'

NORTH

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REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER
PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

SYM	DATE	APPR

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
PUMP STATION ELECTRICAL FLOOR PLAN

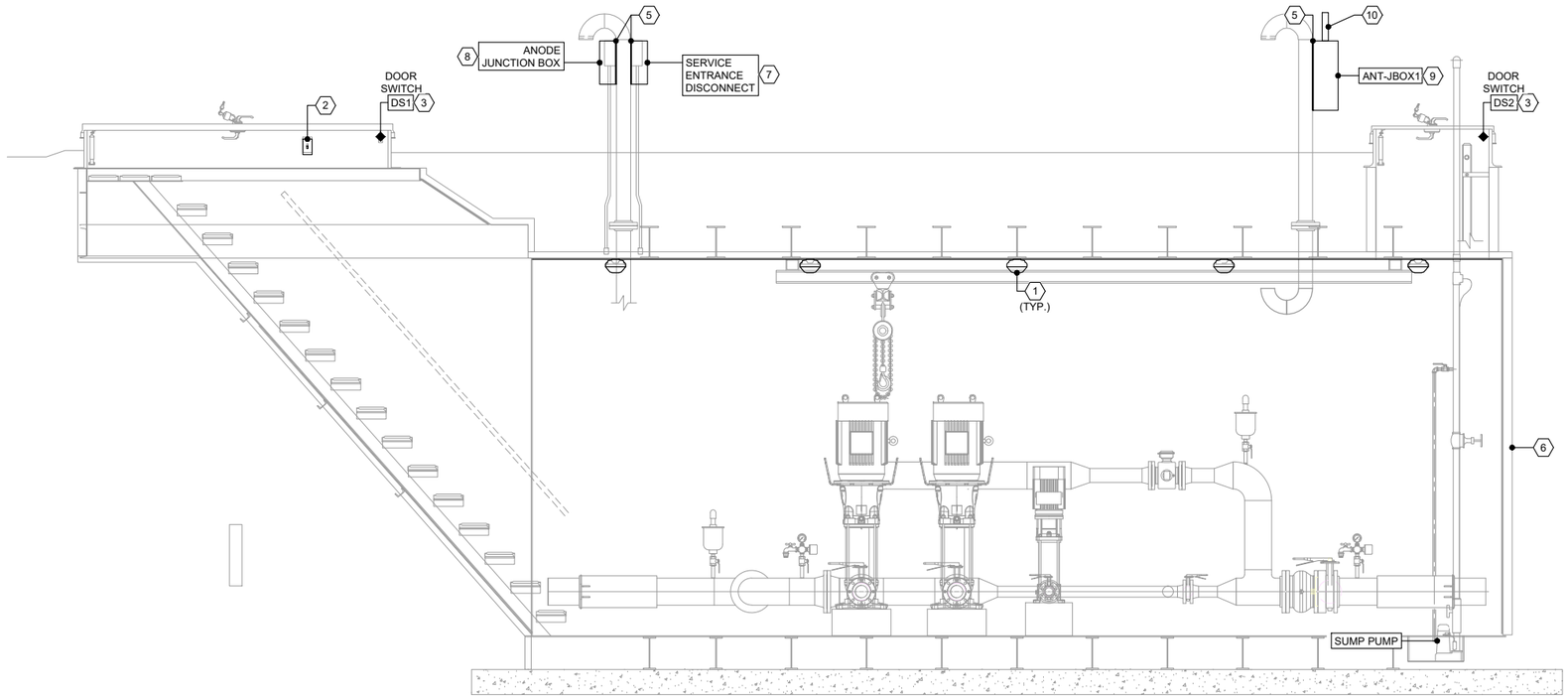
CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **E102**

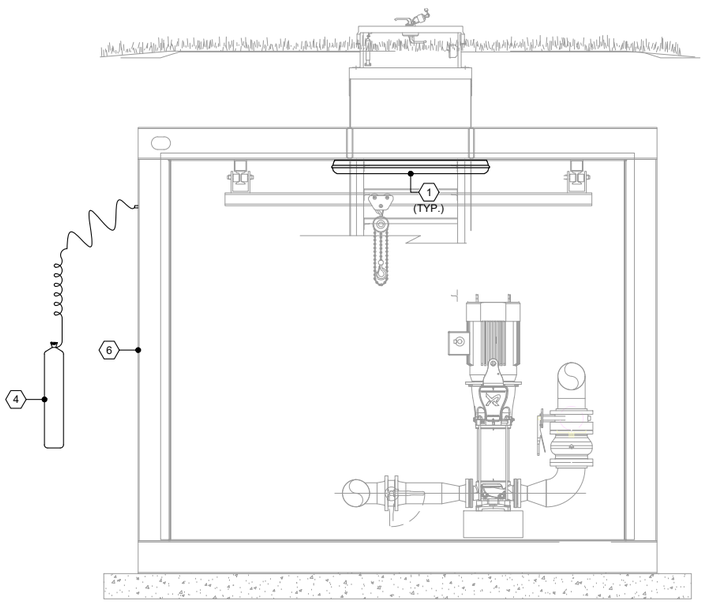
Plotted By: Ian Smith Date: Monday, February 23, 2026

File: C:\Users\smith\DOCACCDocs\AE2S\00581-2025-003 Williston WRRF Water Reuse - Muni Golf\Project Files\06-Electrical\Autocad\Plan Sheets\E-Pump Station Section.dwg



1 E103 PUMP STATION ELECTRICAL PROCESS SECTION

12" 0 1' 2' 3' 4' 5'



2 E103 PUMP STATION ELECTRICAL PROCESS SECTION

12" 0 1' 2' 3' 4' 5'

Plotted By: Ian Smith Date: Monday, February 23, 2026

AE2S

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER
PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

SYM	DATE	APPR

GENERAL NOTES

1. ALL TAGS TO BE PRECEDED WITH "RPS-" UNLESS OTHERWISE DENOTED BY AN ASTERISK "*".
2. ALL EQUIPMENT AND INSTRUMENTATION WITHIN VAULT SHOWN IS TO BE INSTALLED BY PREFABRICATED PUMP STATION MANUFACTURER PRIOR PER THE SPECIFICATIONS INDICATED UNLESS OTHERWISE NOTED.
3. ALL WALL MOUNTED EQUIPMENT TO BE MOUNTED ON 5/8" STAINLESS STEEL STRUT TO PREVENT CONDENSATION BUILDUP BEHIND DEVICES.

CONSTRUCTION NOTES

1. LIGHTS PROVIDED BY PREFABRICATED VAULT MANUFACTURER. FIXTURES EQUAL TO RAB SHARK2-25NW/D10. FIXTURES SHALL HAVE STAINLESS STEEL LATCHES
2. PUMP STATION LIGHT SWITCH PROVIDED BY PREFABRICATED VAULT MANUFACTURER IN LOCATION SHOWN.
3. ACCESS HATCH INTRUSION SWITCH. SEE IO SCHEDULE AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
4. CATHODIC PROTECTION SYSTEM PROVIDED BY PREFABRICATED VAULT MANUFACTURER. CATHODE LEADS TO BE EXTENDED TO ANODE JUNCTION BOX MOUNTED ON AIR VENT AS SHOWN ON STANDARD DETAILS. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.
5. HOT DIPPED GALVANIZED STEEL MOUNTING PLATE FOR ELECTRICAL EQUIPMENT (1/4" THICK STEEL PLATE, MINIMUM) WELDED TO 4" SCREENED AIR VENTILATION PIPE. COORDINATE REQUIRED SIZE OF EACH PLATE FOR SCHEDULED ELECTRICAL EQUIPMENT. WELD PLATES TO AIR VENTILATION PIPES AND WELD IN STEEL BRACING AS REQUIRED FOR ADDITIONAL SUPPORT. COORDINATE SPACE ON EACH MOUNTING PLATE FOR REQUIRED ELECTRICAL EQUIPMENT AS INDICATED.
6. PREFABRICATED UNDERGROUND PUMP STATION. REFERENCE "P" SERIES SHEETS AND ELECTRICAL POWER SCHEMATICS FOR ADDITIONAL DETAILS.
7. 600V, 400A, 3Ø, NEMA 3R HEAVY DUTY SERVICE ENTRANCE RATED DISCONNECT PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER ON AIR INTAKE VENT TUBE AS SHOWN.
8. ANODE JUNCTION BOX PROVIDED BY PREFABRICATED PUMP STATION. SEE STANDARD DETAILS FOR ADDITIONAL INFORMATION.
9. TELEMETRY INTERFACE JUNCTION BOX PROVIDED BY PREFABRICATED PUMP STATION MANUFACTURER. SEE STANDARD DETAILS FOR ADDITIONAL INFORMATION.
10. CELLULAR ANTENNA FURNISHED BY SYSTEMS INTEGRATOR AND TURNED OVER TO ENGINEER FOR INSTALLATION. SEE SPECIFICATION (16921) FOR ADDITIONAL INFORMATION.

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
PUMP STATION ELECTRICAL SECTION

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **E103**

PANEL SCHEDULE

PANEL: RPS-LP1 LOCATION: REUSE VOLTS: 240 / 120 PHASE: 1 W: 3

AMP MAIN BKR: 80A AIC RATING: 22,000 MOUNT: SURFACE FED FROM: RPS-DP1

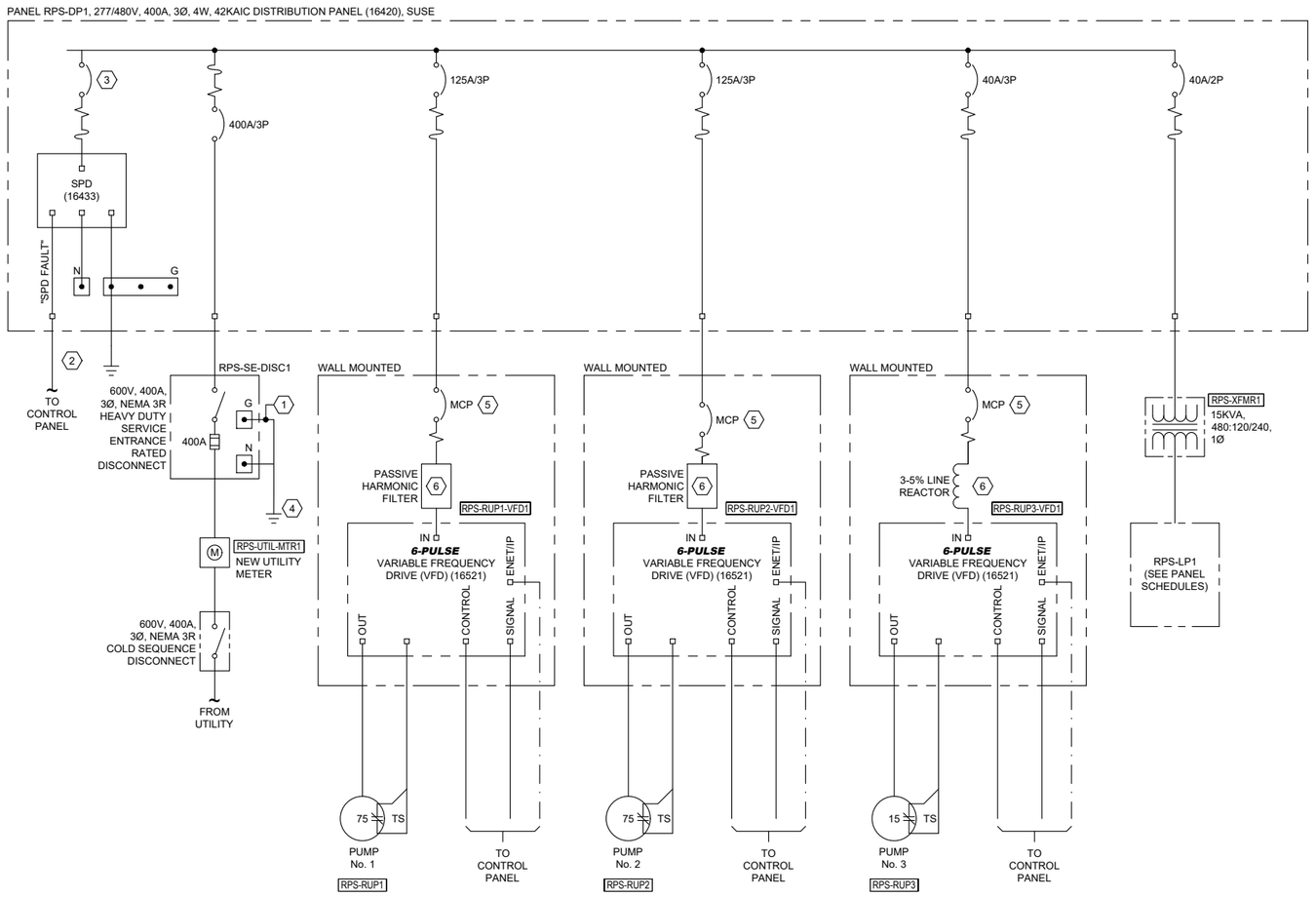
CIRCUIT DESCRIPTION	LOAD VA	CKT. BKR.	P	CKT. No.	PH.	CKT. No.	P	CKT. BKR.	LOAD VA	CIRCUIT DESCRIPTION
ELECTRIC UNIT HEATER (RPS-EUH1)	1500	20	2	1	A	2	2	20	1500	ELECTRIC UNIT HEATER (RPS-EUH2)
	1500			3	B	4			1500	
AREA LIGHTS	500	20	1	5	A	6	1	20	500	SCADA CONTROL PANEL (RPS-CP1)
RECEPTACLE: GENERAL USE	360	20	1	7	B	8	1	20	500	SCADA CONTROL PANEL (RPS-CP1)
SPARE		20	1	9	A	10	1	20	1500	RECEPTACLE: DEHUMDIFIER
RECEPTACLE: EXHAUST FANS	100	20	1	11	B	12	1	20	1500	RECEPTACLE: SUMP PUMP
SPARE		20	1	13	A	14	1	20		SPARE
SPARE		20	1	15	B	16	1	20	250	LIGHTING
SPARE		20	1	17	A	18	1	20	360	CONVENIENCE RECEPTACLE (OUTSIDE)
			1	19	B	20	1			
			1	21	A	22	1			
			1	23	B	24	1			
			1	25	A	26	1			
			1	27	B	28	1			
			1	29	A	30	1			
			1	31	B	32	1			

CONNECTED TOTALS:

KVA	11.57	
AMPS	48.21	
Phase A	48.8	Amps
Phase B	47.6	Amps

NOTES:
- ALL CIRCUIT BREAKERS SHALL BE LOCKABLE IN THE OFF POSITION
- PROVIDE SPD AS SPECIFIED IN SECTION 16433

2 E601 PUMP STATION PANEL SCHEDULE
RPS-LP1



1 E601 PUMP STATION ONE-LINE DIAGRAM

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER
PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

SYM	DATE	APPR

CONSTRUCTION NOTES

1. INSTALL A MAIN BONDING JUMPER AS REQUIRED PER THE NEC.
2. ENSURE GROUND CONNECTION TO VAULT MOUNTED CERVIT POST AND EXTERIOR GROUNDING ELECTRODE SYSTEM.
3. SIZE SPD DISCONNECT PER MANUFACTURER RECOMMENDATIONS.
4. #1/0 BARE STRANDED TO GROUNDING ELECTRODE SYSTEM. BOND TO ALL GROUNDS PER NEC REQUIREMENTS.
5. MOTOR CIRCUIT PROTECTOR AS RECOMMENDED BY THE MANUFACTURER.
6. SEE SPECIFICATION SECTION (16521) FOR INPUT FILTER REQUIREMENTS.

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

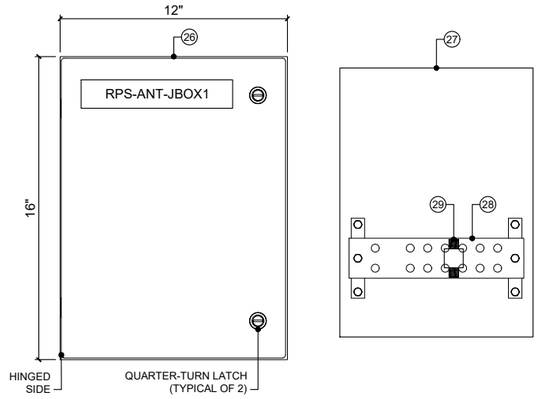
SHEET TITLE:
PUMP STATION ONE-LINE DIAGRAM

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **E601**

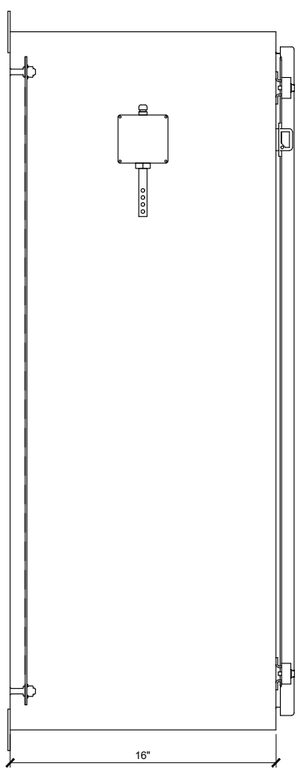
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Plotted By: Ian Smith Date: Monday, February 23, 2026



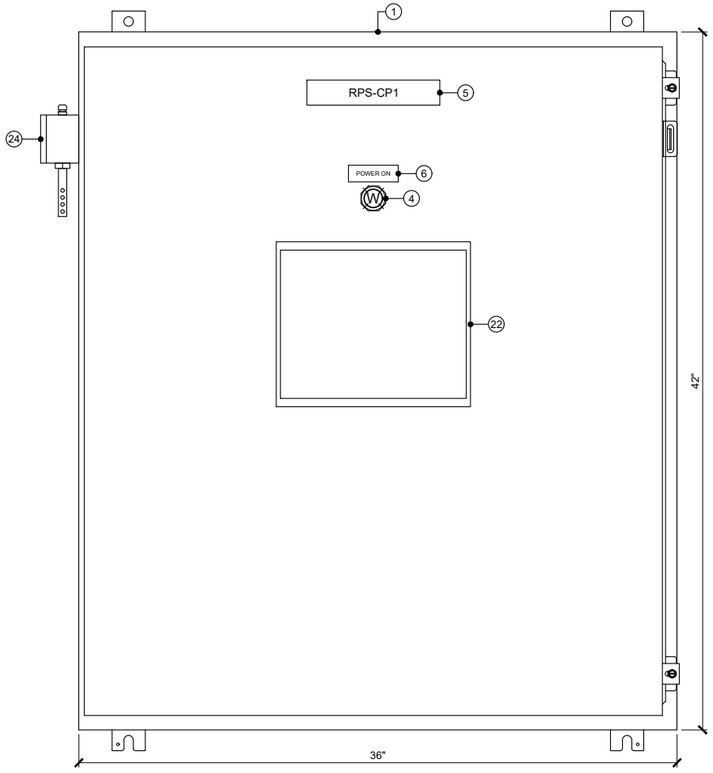
2 / E602 ANTENNA CABLE JUNCTION BOX LAYOUT

RPS-ANT-JBOX1

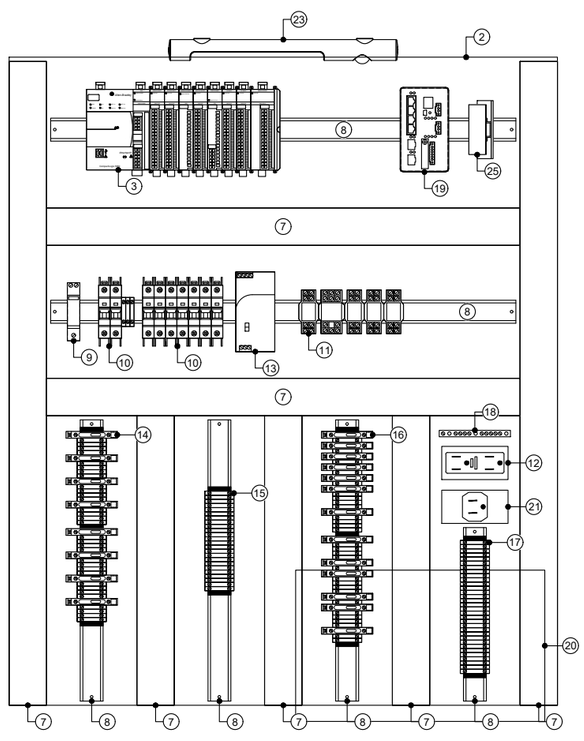
PARTS LIST	
MARK	DESCRIPTION
1	WALL MOUNT ENCLOSURE
2	SUB-PANEL
3	ALLEN BRADLEY PLC (SEE PLC I/O SCHEDULE)
4	30.5mm, LED PANEL LIGHT, WHITE LENS
5	1.5" X 8" BLACK NAMEPLATE WITH WHITE LETTERING (0.5" TEXT)
6	1" X 3" BLACK NAMEPLATE WITH WHITE LETTERING (0.25" TEXT)
7	WIREWAY W/COVER, SIZED TO FIT
8	ZINC PLATED, CHROMATED STEEL, 35mm X 7.5mm DIN RAIL
9	SURGE PROTECTION/LIGHTNING PROTECTION
10	DIN RAIL MOUNTED CIRCUIT BREAKER(S)
11	GENERAL PURPOSE BLADE BASE RELAY
12	20 AMP GFCI RECEPTACLE
13	120VAC/24VDC POWER SUPPLY
14	GENERAL PURPOSE TERMINAL BLOCKS (ASSOCIATED END BARRIERS, END STOPS, SEPARATION PLATES, ETC.), FUSE TERMINALS AND FUSES W/BLOWN FUSE INDICATOR (ANALOG INPUTS - SEE TYPICAL WIRING SCHEMATICS)
15	GENERAL PURPOSE TERMINAL BLOCKS (ASSOCIATED END BARRIERS, END STOPS, SEPARATION PLATES, ETC.), FUSE TERMINALS AND FUSES W/BLOWN FUSE INDICATOR (ANALOG OUTPUTS - SEE TYPICAL WIRING SCHEMATICS)
16	GENERAL PURPOSE TERMINAL BLOCKS (ASSOCIATED END BARRIERS, END STOPS, SEPARATION PLATES, ETC), FUSE TERMINALS AND FUSES W/BLOWN FUSE INDICATOR (DIGITAL INPUTS - SEE TYPICAL WIRING SCHEMATICS)
17	GENERAL PURPOSE RELAY TERMINAL BLOCKS, SCREW CONNECTION, (ASSOCIATED END BARRIERS, END STOPS, SEPARATION PLATES, ETC.) (RELAY OUTPUTS - SEE TYPICAL WIRING SCHEMATICS)
18	GROUND BUSS BAR
19	ETHERNET SWITCH
20	UNINTERRUPTIBLE POWER SUPPLY
21	UNINTERRUPTIBLE POWER SUPPLY RECEPTACLE
22	OPERATOR INTERFACE
23	LIGHT PACKAGE, LED, DOOR SWITCH
24	AIR TEMPERATURE TRANSMITTER
25	CELLULAR MODEM
26	HINGED DOOR, PAINTED STEEL WALL-MOUNT ENCLOSURE, NVENT/HOFFMAN CSD16126, OR EQUIVALENT FOR INDOOR APPLICATIONS OR HINGED DOOR, STAINLESS STEEL WALL MOUNT ENCLOSURE, HOFFMAN A16H1206SSLP OR EQUIVALENT FOR OUTDOOR ENCLOSURES.
27	INNER SUB-PANEL
28	HUBBELL GROUNDING AND BONDING INSULATED COPPER BUS BAR (2"X10"X1/4"). PART# HBBB14210A, OR EQUIVALENT.
29	ANTENNA LIGHTNING ARRESTOR (POLYPHASER)



SIDE VIEW



ENCLOSURE LAYOUT



SUB-PANEL LAYOUT

1 / E602 CONTROL PANEL LAYOUT

RPS-CP1

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER
PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

SYM	DATE	APPR

CONTROL PANEL NOTES

1. NEMA TYPE 12, 14 GAUGE STEEL WALL MOUNT ENCLOSURE WITH SUB PANEL
2. SINGLE DOOR HINGED ENCLOSURE
3. APPROXIMATE DIMENSIONS: H: 42", W: 36", D: 16"
4. PROVIDE A COMPLETE WORKING SYSTEM WITH ALL ASSOCIATED CABLES, CONNECTORS, FASTENERS, ETC.
5. PANEL TO BE UL 508A LISTED
6. SUB-PANEL LAYOUT IS TO BE USED AS A GENERAL LAYOUT. EXACT DIMENSIONS, COMPONENT QUANTITIES AND EXACT LAYOUT TO BE DETERMINED BY THE HARDWARE SYSTEM INTEGRATOR.

ANTENNA JUNCTION BOX NOTES

1. ENCLOSURE WITH SUB PANEL SHALL BE A NEMA TYPE 4, 12, 13, IP66, 16 GAUGE STEEL (INTERIOR) OR NEMA TYPE 4X, STAINLESS STEEL (EXTERIOR).
2. APPROXIMATE ENCLOSURE DIMENSIONS: H: 16", W: 12", D: 6"
3. SUB-PANEL LAYOUT IS TO BE USED AS A GENERAL LAYOUT ONLY. FINAL EXACT DIMENSIONS, COMPONENT QUANTITIES AND EXACT LAYOUT TO BE CONFIRMED.
4. ENCLOSURE TO BE UL LISTED.

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
CONTROL PANEL LAYOUT

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **E602**

File: C:\Users\ianm\DOCACCDocs\AE2S\00581-2025-003 Williston WRRF Water Reuse - Muni Golf\Project Files\06-Electrical\Autocad\Plan Sheets\E-Control Panel.dwg

Plotted By: Ian Smith Date: Monday, February 23, 2026

Rack/Slot	Point	Type	Tagname	Description	EGU Lo	EGU Hi	EGU Tag	Signal
RACK 0 SLOT 0 5069-L306ER				COMPACTLOGIX 5380 PROCESSOR				
RACK 0 SLOT 1 5069-IF4IH	0	AI	RPS-TT1.TI	REUSE PUMP STATION AMBIENT TEMPERATURE	-13.0	167.0	°F	4-20 mA
	1	AI	RPS-PIT1.PI	REUSE PUMP STATION INFLUENT PRESSURE	0.0	300.0	PSI	4-20 mA
	2	AI	RPS-PIT2.PI	REUSE PUMP STATION EFFLUENT PRESSURE	0.0	300.0	PSI	4-20 mA
	3	AI	RPS-FIT1.FI	REUSE PUMP STATION EFFLUENT FLOW	0.0	600.0	GPM	4-20 mA
RACK 0 SLOT 2 5069-IF4IH	0	AI	RPS-RUP1.SI	REUSE PUMP STATION REUSE PUMP No. 1 SPEED FEEDBACK	0.0	100.0	%	4-20 mA
	1	AI	RPS-RUP2.SI	REUSE PUMP STATION REUSE PUMP No. 2 SPEED FEEDBACK	0.0	100.0	%	4-20 mA
	2	AI	RPS-RUP3.SI	REUSE PUMP STATION REUSE PUMP No. 3 SPEED FEEDBACK	0.0	100.0	%	4-20 mA
	3	AI		WIRED SPARE				4-20mA
RACK 0 SLOT 3 5069-ARM				ADDRESS RESERVE MODULE				
RACK 0 SLOT 4 5069-OF8	0	AO	RPS-RUP1.SI	REUSE PUMP STATION REUSE PUMP No. 1 SPEED COMMAND	0.0	60.0	HZ	4-20 mA
	1	AO	RPS-RUP2.SI	REUSE PUMP STATION REUSE PUMP No. 2 SPEED COMMAND	0.0	60.0	HZ	4-20 mA
	2	AO	RPS-RUP3.SI	REUSE PUMP STATION REUSE PUMP No. 3 SPEED COMMAND	0.0	60.0	HZ	4-20 mA
	3	AO		WIRED SPARE				4-20 mA
	4	AO		WIRED SPARE				4-20 mA
	5	AO		WIRED SPARE				4-20 mA
	6	AO		WIRED SPARE				4-20 mA
	7	AO		WIRED SPARE				4-20 mA
RACK 0 5069-FPD				FIELD POTENTIAL DISTRIBUTOR				
RACK 0 SLOT 5 5069-IA16	0	DI	RPS-DP1.XA	REUSE PUMP STATION DISTRIBUTION PANEL SPD FAILURE	ALARM	NORMAL		120VAC
	1	DI	RPS-CP1.JA	REUSE PUMP STATION CONTROL PANEL CONTROL POWER FAILURE	ALARM	NORMAL		120VAC
	2	DI	RPS-CP1.EA	REUSE PUMP STATION CONTROL PANEL UPS POWER FAILURE	ALARM	NORMAL		120VAC
	3	DI	RPS-CP1.YA	REUSE PUMP STATION CONTROL PANEL UPS FAULT	ALARM	NORMAL		120VAC
	4	DI	RPS-CP1.XA	REUSE PUMP STATION CONTROL PANEL SPD FAILURE	ALARM	NORMAL		120VAC
	5	DI		WIRED SPARE				120VAC
	6	DI	RPS-FLS1.LAH	REUSE PUMP STATION FLOODED	ALARM	NORMAL		120VAC
	7	DI	RPS-DS1.ZIO	REUSE PUMP STATION MAIN ACCESS INTRUSION	ALARM	NORMAL		120VAC
	8	DI	RPS-DS2.ZIO	REUSE PUMP STATION SECONDARY ACCESS INTRUSION	ALARM	NORMAL		120VAC
	9	DI		WIRED SPARE				120VAC
	10	DI		WIRED SPARE				120VAC
	11	DI		WIRED SPARE				120VAC
	12	DI		WIRED SPARE				120VAC
	13	DI		WIRED SPARE				120VAC
	14	DI		WIRED SPARE				120VAC
	15	DI		WIRED SPARE				120VAC
RACK 0 SLOT 6 5069-IA16	0	DI	RPS-RUP1.YN	REUSE PUMP STATION REUSE PUMP No. 1 IN AUTO	LOCAL	IN AUTO		120VAC
	1	DI	RPS-RUP1.YL	REUSE PUMP STATION REUSE PUMP No. 1 RUNNING	OFF	RUNNING		120VAC
	2	DI	RPS-RUP1.YA	REUSE PUMP STATION REUSE PUMP No. 1 FAULT	ALARM	NORMAL		120VAC
	3	DI	RPS-RUP1.TAH	REUSE PUMP STATION REUSE PUMP No. 1 OVERTEMP	ALARM	NORMAL		120VAC
	4	DI		WIRED SPARE				120VAC
	5	DI	RPS-RUP2.YN	REUSE PUMP STATION REUSE PUMP No. 2 IN AUTO	LOCAL	IN AUTO		120VAC
	6	DI	RPS-RUP2.YL	REUSE PUMP STATION REUSE PUMP No. 2 RUNNING	OFF	RUNNING		120VAC
	7	DI	RPS-RUP2.YA	REUSE PUMP STATION REUSE PUMP No. 2 FAULT	ALARM	NORMAL		120VAC
	8	DI	RPS-RUP2.TAH	REUSE PUMP STATION REUSE PUMP No. 2 OVERTEMP	ALARM	NORMAL		120VAC
	9	DI		WIRED SPARE				120VAC
	10	DI	RPS-RUP3.YN	REUSE PUMP STATION REUSE PUMP No. 3 IN AUTO	LOCAL	IN AUTO		120VAC
	11	DI	RPS-RUP3.YL	REUSE PUMP STATION REUSE PUMP No. 3 RUNNING	OFF	RUNNING		120VAC
	12	DI	RPS-RUP3.YA	REUSE PUMP STATION REUSE PUMP No. 3 FAULT	ALARM	NORMAL		120VAC
	13	DI	RPS-RUP3.TAH	REUSE PUMP STATION REUSE PUMP No. 3 OVERTEMP	ALARM	NORMAL		120VAC
	14	DI		WIRED SPARE				120VAC
	15	DI		WIRED SPARE				120VAC
RACK 0 SLOT 7 5069-OW16	0	RO	RPS-RUP1.MC	REUSE PUMP STATION REUSE PUMP No. 1 REQUIRED	OFF	REQUIRED		RELAY
	1	RO	RPS-RUP2.MC	REUSE PUMP STATION REUSE PUMP No. 2 REQUIRED	OFF	REQUIRED		RELAY
	2	RO	RPS-RUP3.MC	REUSE PUMP STATION REUSE PUMP No. 3 REQUIRED	OFF	REQUIRED		RELAY
	3	RO		WIRED SPARE				RELAY
	4	RO		WIRED SPARE				RELAY
	5	RO		WIRED SPARE				RELAY
	6	RO		WIRED SPARE				RELAY
	7	RO		WIRED SPARE				RELAY
	8	RO		WIRED SPARE				RELAY
	9	RO		WIRED SPARE				RELAY
	10	RO		WIRED SPARE				RELAY
	11	RO		WIRED SPARE				RELAY
	12	RO		WIRED SPARE				RELAY
	13	RO		WIRED SPARE				RELAY
	14	RO		WIRED SPARE				RELAY
	15	RO		WIRED SPARE				RELAY

1 E603 **PLC IO SCHEDULE**
RPS-CP1

AE2S

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER
PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

SYM	DATE	APPR

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
PLC IO SCHEDULE

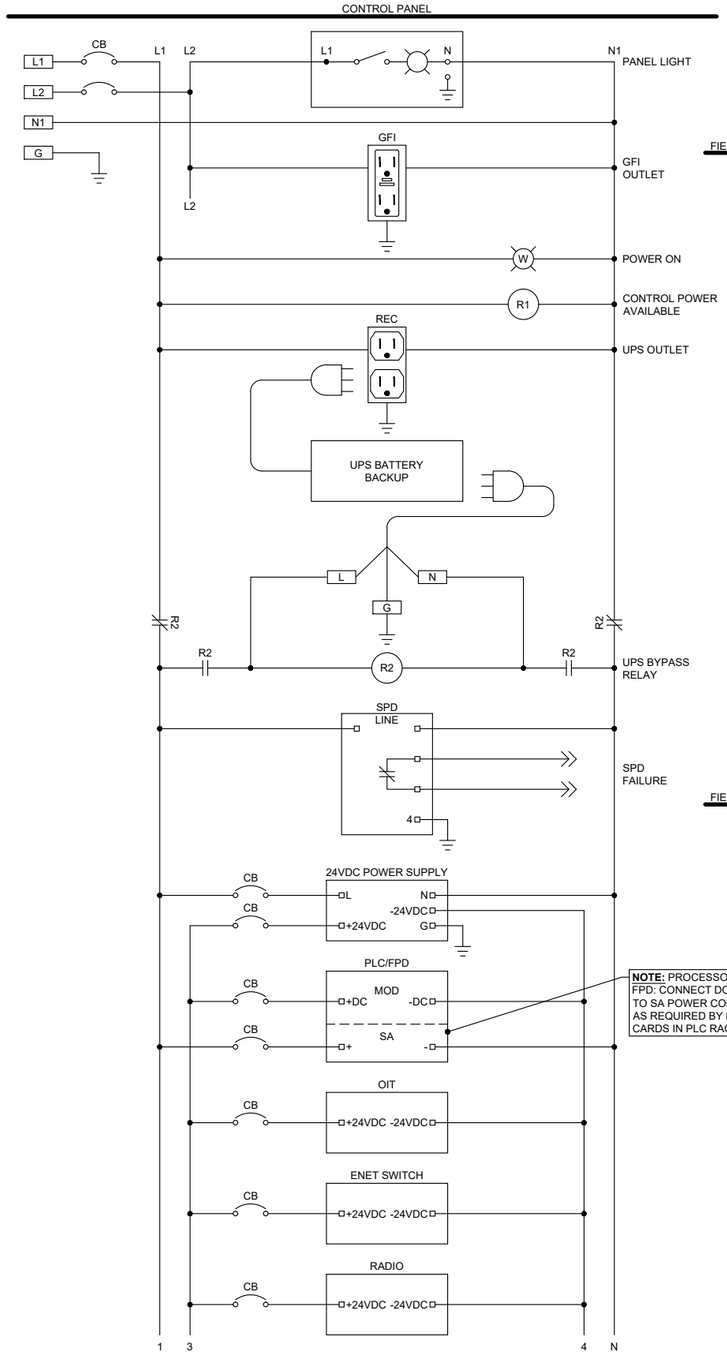
CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

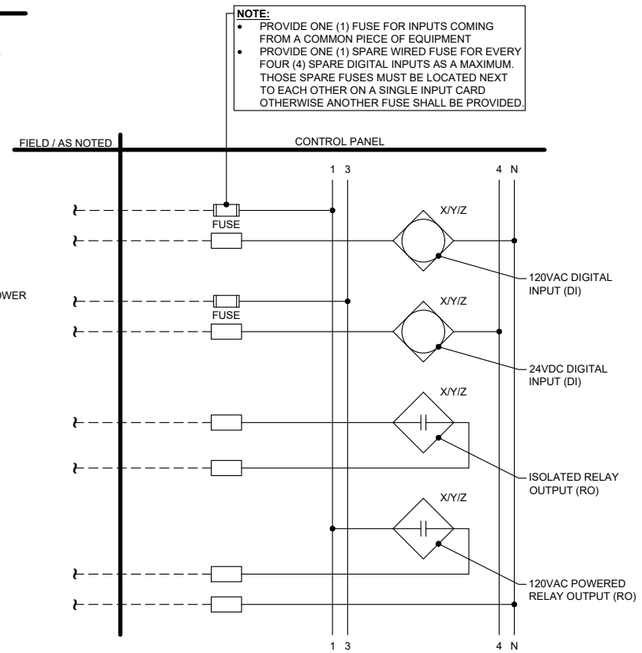
PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **E603**

File: C:\Users\ianm\DOCUMENTS\ACCDocs\AE2S\00581-2025-003 Williston WRRF Water Reuse - Muni Golf\Project Files\06-Electrical\Autocad\Plan Sheets\E-Control Panel.dwg

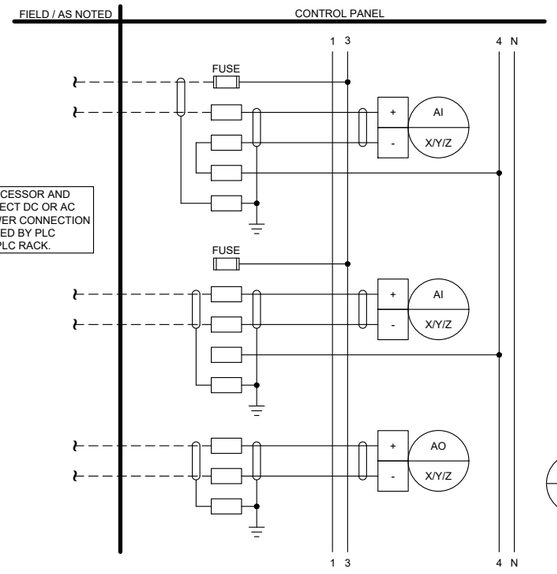
Plotted By: Ian Smith Date: Monday, February 23, 2026



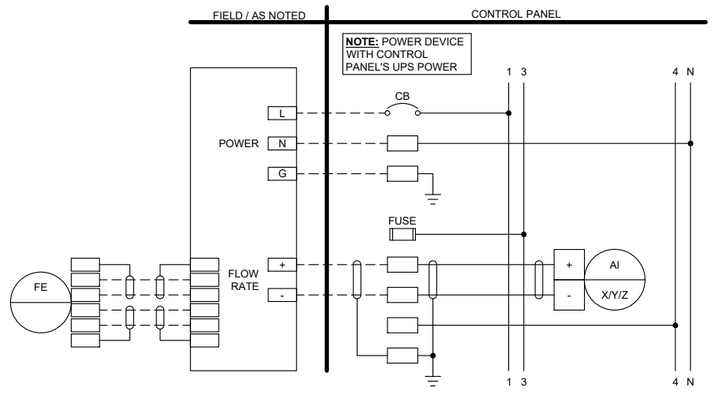
1 E604 **TYPICAL PANEL POWER WIRING SCHEMATIC**
SCALE: NONE



2 E604 **TYPICAL DIGITAL WIRING SCHEMATIC**
SCALE: NONE



3 E604 **TYPICAL ANALOG WIRING SCHEMATIC**
SCALE: NONE



4 E604 **TYPICAL FLOW METER WIRING SCHEMATIC**
SCALE: NONE

CONTROL LABELING REFERENCE

X Y Z — CHANNEL / SLOT / RACK

1 2 3 — CHANNEL - 3 / SLOT - 2 / RACK - 1

EXAMPLE: 1/2/3

POWER RAIL LEGEND

CALLOUT	DESCRIPTION
L1,N1	120VAC NON-UPS POWER
1,N	120VAC UPS POWER
3,4	24VDC UPS POWER

AE2S

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER
PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

APPR	DATE	SYM

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
TYPICAL WIRING DIAGRAMS

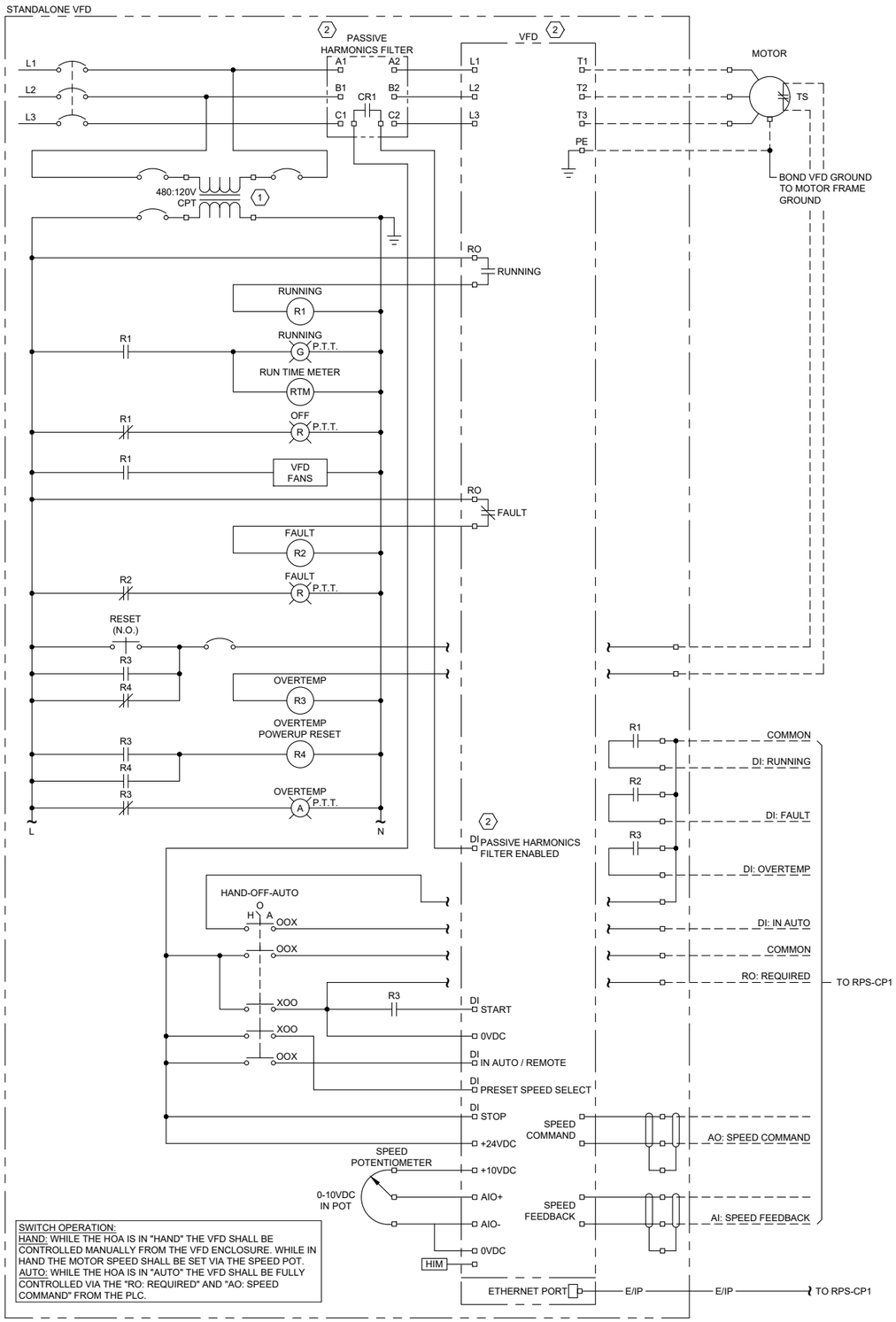
CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **E604**

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Plotted By: Ian Smith Date: Monday, February 23, 2026



1 E605 VFD WIRING SCHEMATIC
RPS-RUP1-VFD1, RPS-RUP2-VFD1

CONSTRUCTION NOTES

1. THE CONTROL POWER TRANSFORMER SHALL BE SIZED ADEQUATELY FOR ALL MOTOR RELATED CONTROLS SUCH AS THE CONTROL CIRCUIT AND MOTOR HEATER.
2. REFER TO THE SPECIFICATIONS FOR VFD TYPE AND INPUT/OUTPUT FILTERING REQUIREMENTS. THE INTENT IS TO PULL THE PASSIVE HARMONIC CAPACITORS IN AND DROP OUT OF THE CIRCUIT WHEN VFD IS AT SPEED. THIS IS AT APPROXIMATELY 39HZ OR 5% LOWER THAN THE MINIMUM MOTOR SPEED, WHICH EVER IS LOWER. CR1 IS THE CONTROL RELAY FOR PULLING IN AND OUT THE CORRECTION CAPACITORS.

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Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER
PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

SYM	DATE	APPR

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT
Advanced Engineering and Environmental Services, LLC www.ae2s.com

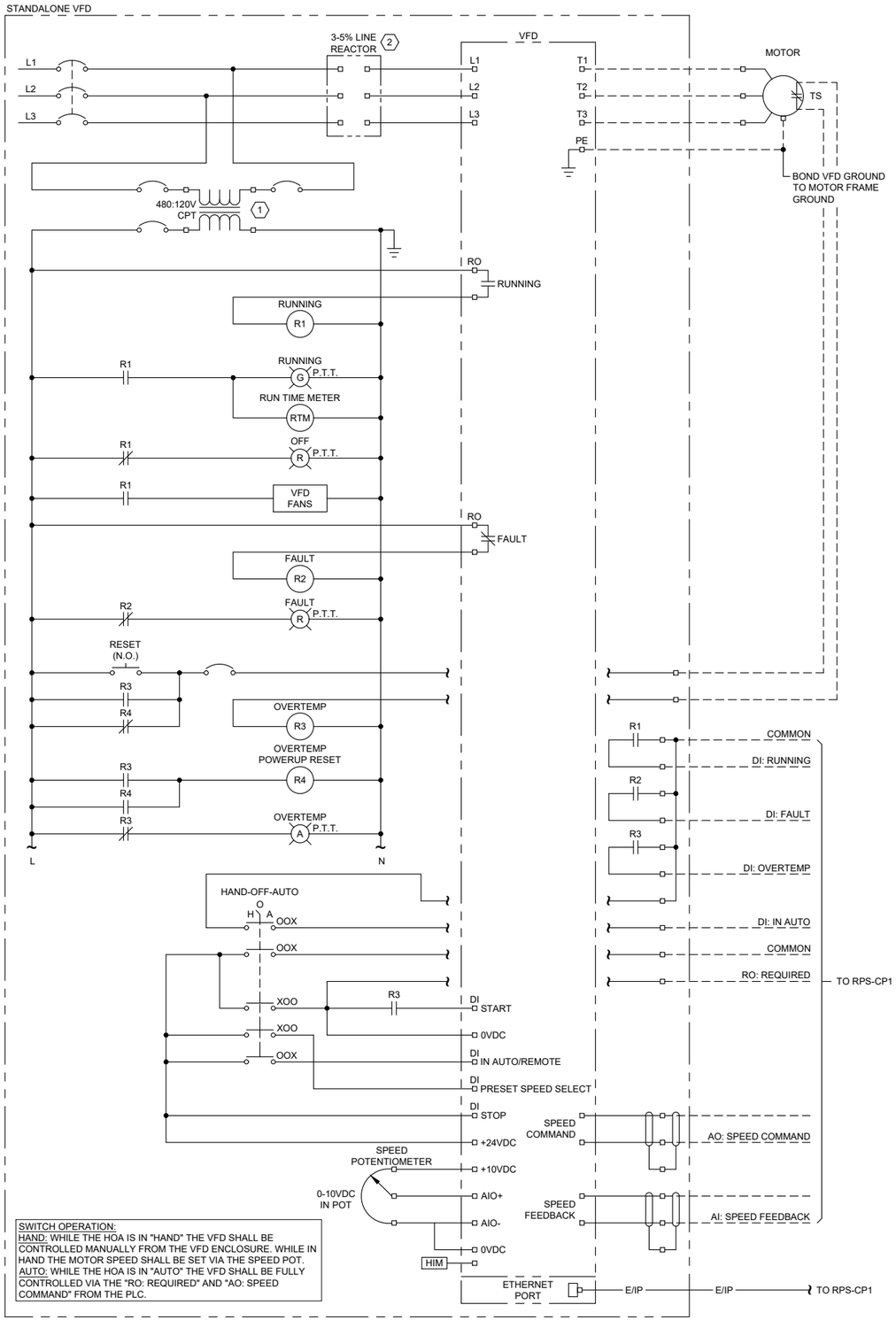
SHEET TITLE:
VFD WIRING SCHEMATIC

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **E605**

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Plotted By: Ian Smith Date: Monday, February 23, 2026



1 E606 **VFD WIRING SCHEMATIC**
RPS-RUP3-VFD1

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REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER
PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

SYM	DATE	APPR

CONSTRUCTION NOTES

1. THE CONTROL POWER TRANSFORMER SHALL BE SIZED ADEQUATELY FOR ALL MOTOR RELATED CONTROLS SUCH AS THE CONTROL CIRCUIT AND MOTOR HEATER.
2. THE VFD SHALL BE 6 PULSE WITH INPUT AND OUTPUT FILTERING IN TYPE. REFER TO THE SPECIFICATIONS FOR DETAILS.

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
VFD WIRING SCHEMATIC

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

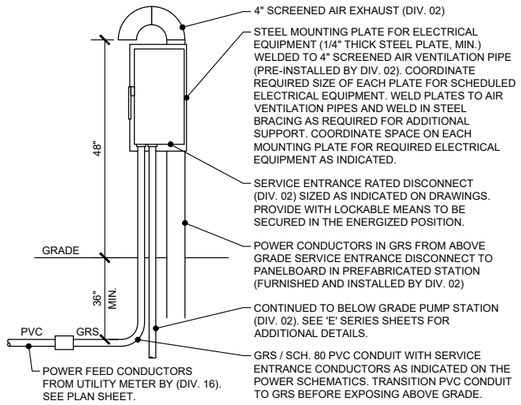
PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:

SHEET DESIGNATOR:

SHEET NO: **E606**

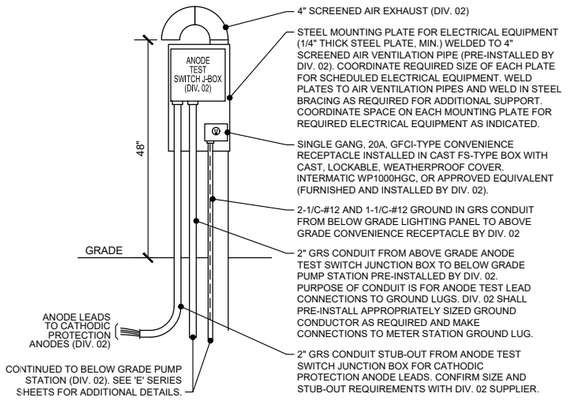
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Plotted By: Ian Smith Date: Monday, February 23, 2026



1 E701 SERVICE ENTRANCE RATED DISCONNECT ELEVATION DETAIL

SCALE: NONE

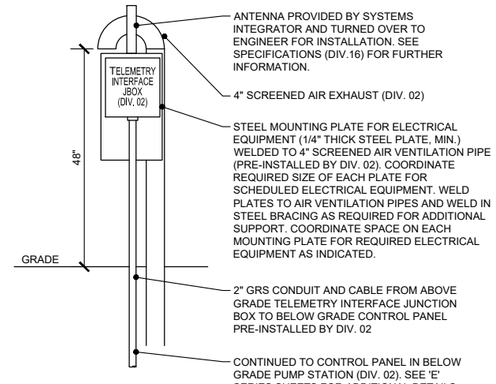
EQPM067



2 E701 ANODE TEST SWITCH JBOX ELEVATION DETAIL

SCALE: NONE

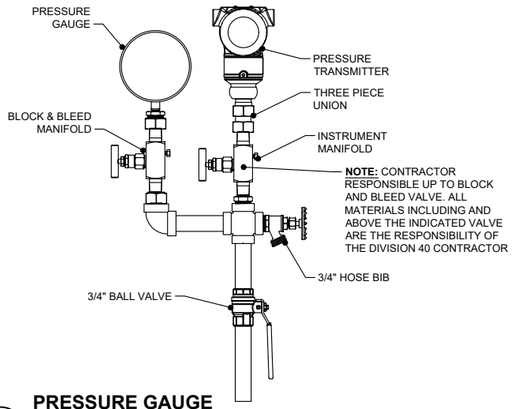
EQPM068



3 E701 ANTENNA JBOX ELEVATION DETAIL

SCALE: NONE

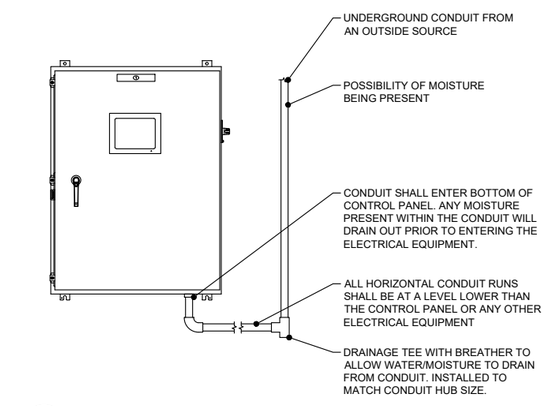
EQPM069



4 E701 PRESSURE GAUGE TRANSMITTER ASSEMBLY w/ SAMPLE TAP

SCALE: NONE

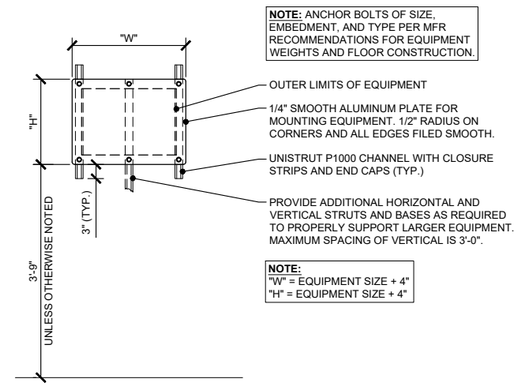
EQPM121



5 E701 CONDUIT 'DRAINAGE' TEE DETAIL

SCALE: NONE

EQPM020



6 E701 WALL MOUNTED EQUIPMENT DETAIL

SCALE: NONE

EQPM022

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REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER
PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

APPR	DATE	SYM

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
VARIOUS DETAILS

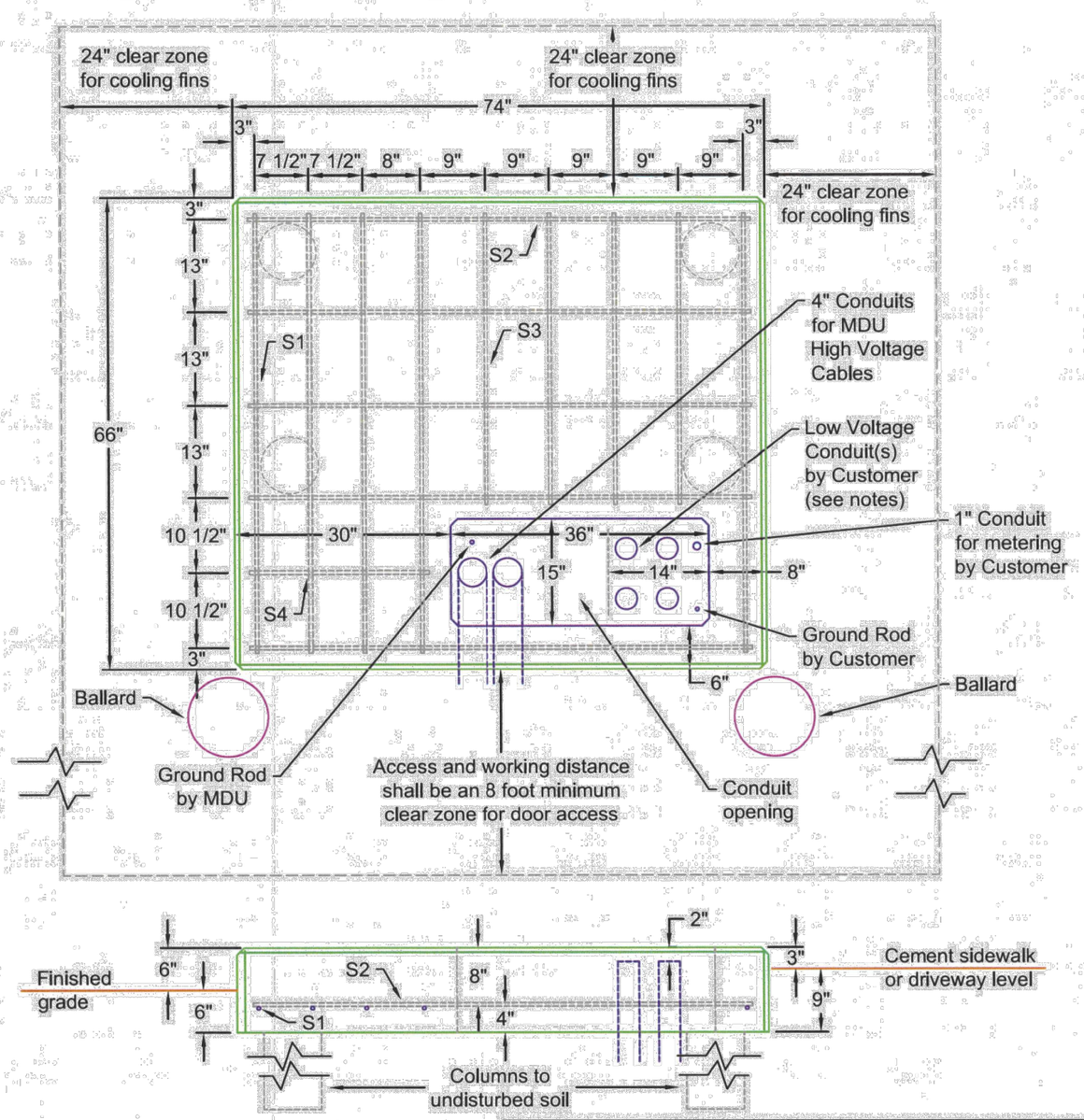
CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: **E701**

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Plotted By: Ian Smith Date: Monday, February 23, 2026

NOTE: Entire pad must be 5' from ANY building.



TRANSFORMER LOCATION

1. Entire pad must be five feet from any building.
2. All oil-filled padmounted transformers must be installed so any flow of oil resulting from a failure of the transformer will flow away from any structure.
3. A transformer should be located away from traffic areas or protected with ballards such as concrete filled pipes or steel bumper posts, provided by the customer.
4. When locating pad, consider overhead clearance for possible transformer replacement.
5. Compact soil to avoid tilting and settling. Columns required except on undisturbed soil.

STEEL REINFORCING ROD

MARK	QTY.	SIZE	LENGTH
S1	5	1/2"	62"
S2	5	1/2"	70"
S3	4	1/2"	41"
S4	1	1/2"	25"

NOTES:

1. Transformer pad, service cable, conduit, and ground rod or mat for service cable grounding are furnished by customer; connections by company.
2. Reinforcing steel must be secured with tie wire at all intersections.
3. All exposed edges and corners to have 1" chamfer.
4. Minimum of 1.2 Cubic Yards of concrete required.
5. Low voltage conduits by customer must be installed within 14" area noted.
6. Where the customer has more than four parallel conductors, a CT/Transition Cabinet and conduits to the transformer location may be required.
7. Top surface shall be level for concrete pad.

CONCRETE PAD
FOR 3-PH TRANSFORMER
SIZES 45 THROUGH 300 KVA

3/28/2014	CW	REDRAWN IN AUTOCAD
6/2/1999	CAH	CHANGE FRONT CLEAR ZONE & CENTER
6/2/1999	CAH	MOVE CONDUIT OPENING 7" TO THE RIGHT

APPROVED: DLA
DATE: 04/11/14

MDU® ELECTRIC DISTRIBUTION STANDARDS

SCALE: NONE
DRAWING NO: 19-803

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REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

SYM	DATE	APPR

PROJECT TITLE: WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE: VARIOUS DETAILS

CLIENT: CITY OF WILLISTON, WILLISTON, ND

PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:
SHEET DESIGNATOR:
SHEET NO: E702

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Plotted By: Ian Smith Date: Monday, February 23, 2026

File: C:\Users\smith\DOCACO2\ccsAE2S\00581-2025-003 Williston WRRF Water Reuse - Muni Golf\Project Files\06-Electrical\Autocad\Plan Sheets\E-Cable and Conduit Schedule.dwg

CABLE AND CONDUIT SCHEDULE

TAGNAME	IDENTIFIER	CONDUIT QTY	CONDUIT SIZE	COMBINED CONDUIT ID	SERVICE RATING VOLT	SERVICE RATING PHASE	CONDUCTORS # OF PARALLEL SETS	CONDUCTORS CURRENT CARRYING QTY	CONDUCTORS CURRENT CARRYING TYPE	CONDUCTORS CURRENT CARRYING SIZE	CONDUCTORS NTRL	CONDUCTORS GND	FROM	TO	NOTES CABLE TYPE
UTILITY DISCONNECT		1	3-1/2"		277/480	3	1	3	1/C	#500	#500	#3	UTILITY TRANSFORMER	COLD SEQUENCE UTILITY DISCONNECT	TYPE P2
RPS-UTIL-MTR1		1	3-1/2"		277/480	3	1	3	1/C	#500	#500	#3	COLD SEQUENCE UTILITY DISCONNECT	RPS-UTIL-MTR1	TYPE P2
RPS-SE-DISC1		1	3-1/2"		277/480	3	1	3	1/C	#500	#500	#3	RPS-UTIL-MTR1	RPS-SE-DISC1	TYPE P2
RPS-DP1	A	1	3-1/2"		277/480	3	1	3	1/C	#500	#500	#3	RPS-SE-DISC1	RPS-DP1	TYPE P2
	B	1	3/4"		CONTROL	-	-	2	1/C	#14	-	-	RPS-DP1	RPS-CP1	TYPE P1
RPS-RUP1	A	1	1-1/2"		480	3	1	3	1/C	#1	-	#6	RPS-DP1	RPS-RUP1-VFD1	TYPE P1
	B	1	2"		480	3	1	1	3/C	#1	-	#1	RPS-RUP1-VFD1	RPS-RUP1	TYPE P4
	C	1	3/4"		CONTROL	-	-	2	1/C	#14	-	-	RPS-RUP1-VFD1	RPS-RUP1 (RPS-RUP1-TSH1)	TYPE P1
	D	1	3/4"		CONTROL	-	-	8	1/C	#14	-	-	RPS-CP1	RPS-RUP1-VFD1	TYPE P1
	E	1	1"		SIGNAL	-	-	2	2/C	#16	-	SHIELD	RPS-CP1	RPS-RUP1-VFD1	TYPE S1
	F	1	3/4"		DATA	-	-	1	CAT 6 SHIELDED	-	-	-	RPS-CP1	RPS-RUP1-VFD1	TYPE D3
RPS-RUP2	A	1	1-1/2"		480	3	1	3	1/C	#1	-	#6	RPS-DP1	RPS-RUP2-VFD1	TYPE P1
	B	1	2"		480	3	1	1	3/C	#1	-	#1	RPS-RUP2-VFD1	RPS-RUP2	TYPE P4
	C	1	3/4"		CONTROL	-	-	2	1/C	#14	-	-	RPS-RUP2-VFD1	RPS-RUP2 (RPS-RUP2-TSH1)	TYPE P1
	D	1	3/4"		CONTROL	-	-	8	1/C	#14	-	-	RPS-CP1	RPS-RUP2-VFD1	TYPE P1
	E	1	1"		SIGNAL	-	-	2	2/C	#16	-	SHIELD	RPS-CP1	RPS-RUP2-VFD1	TYPE S1
	F	1	3/4"		DATA	-	-	1	CAT 6 SHIELDED	-	-	-	RPS-CP1	RPS-RUP2-VFD1	TYPE D3
RPS-RUP3	A	1	3/4"		480	3	1	3	1/C	#8	-	#10	RPS-DP1	RPS-RUP3-VFD1	TYPE P1
	B	1	1-1/4"		480	3	1	1	3/C	#10	-	#10	RPS-RUP3-VFD1	RPS-RUP3	TYPE P4
	C	1	3/4"		CONTROL	-	-	2	1/C	#14	-	-	RPS-RUP3-VFD1	RPS-RUP3 (RPS-RUP3-TSH1)	TYPE P1
	D	1	3/4"		CONTROL	-	-	8	1/C	#14	-	-	RPS-CP1	RPS-RUP3-VFD1	TYPE P1
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RPS-FIT1	A	1	3/4"		120	1	1	1	1/C	#12	#12	#12	RPS-CP1	RPS-FIT1	TYPE P1
	B	1	3/4"		SIGNAL	-	-	1	2/C	#16	-	SHIELD	RPS-CP1	RPS-FIT1	TYPE S1
	C	1	3/4"		SIGNAL	-	MANUFACTURER'S CABLE						RPS-FIT1	RPS-FE1	TYPE S4
RPS-FLS1		1	3/4"		CONTROL	-	-	1	1/C	#14	-	-	RPS-CP1	RPS-FLS1	TYPE P1
RPS-DS1		1	3/4"		CONTROL	-	-	1	1/C	#14	-	-	RPS-CP1	RPS-DS1	TYPE P1
RPS-DS2		1	3/4"		CONTROL	-	-	1	1/C	#14	-	-	RPS-CP1	RPS-DS2	TYPE P1
RPS-ANT-JBOX1		1	3/4"		ANTENNA	-	-	1	LMR-200	-	-	-	RPS-CP1	RPS-ANT-JBOX1	TYPE A1
RPS-EUH1		1	3/4"		240	1	1	2	1/C	#12	-	#12	RPS-LP1	RPS-EUH1	TYPE P1
RPS-EUH2		1	3/4"		240	1	1	2	1/C	#12	-	#12	RPS-LP1	RPS-EUH2	TYPE P1
RPS-CP1	A	1	3/4"		120	1	1	1	1/C	#12	#12	#12	RPS-LP1	RPS-CP1	TYPE P1
		"	"		120	1	1	1	1/C	#12	#12	#12	RPS-LP1	RPS-CP1	TYPE P1

Plotted By: Ian Smith Date: Monday, February 23, 2026

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REGISTERED PROFESSIONAL ENGINEER
ADAM WAHLER
PE-7886
02-20-2026
Date
NORTH DAKOTA

STATUS: FINAL

SYM	DATE	APPR

PROJECT TITLE:
WILLISTON WATER RESOURCE RECOVERY FACILITY (WRRF) REUSE PROJECT

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
CABLE AND CONDUIT SCHEDULE

CLIENT:
CITY OF WILLISTON
WILLISTON, ND

PREPARED BY: IPS
CHECKED BY: MAW
APPROVED BY: AMW

PROJECT NO: P00581-2025-003
DATE: FEBRUARY 2026
ALT. PROJECT NO:

SHEET DESIGNATOR:

SHEET NO:
E801